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NO. 1 PLAIN STRAIGHT SIDED PRESS.



FIG. 11540.

NO. 1 PLAIN STRAIGHT SIDED PRESS WITH SPECIAL ROUND BED.



FIG. 11540A.

POWER PRESSES.

NO. 7 GEARED STRAIGHT SIDED PRESS.

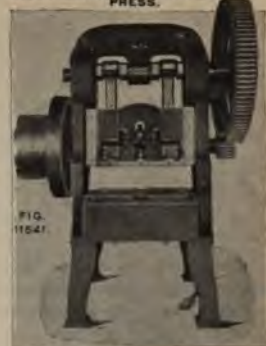


FIG. 11541.

NO. 6 STRAIGHT SIDED GEARED PRESS WITH SPECIAL ROUND BED.



FIG. 11541A.

SPECIFICATIONS FIGS. 11540 TO 11541A.

Number of Press	1	2	3	4	5	6	7	8	9	10	20
Weight, plain, lbs.	1,800	2,400	3,500	4,000	4,500	5,200					
Weight, geared, lbs.	2,300	3,000	4,200	4,700	5,200	6,000	7,600	9,000	11,000	14,000	36,000
Distance from bed to slide, when up.	8"	8"	10"	10"	12"	12"	12"	12"	12"	12"	16"
Opening in bed.	8" x 16"	10" x 20"	12" x 24"	12" x 28"	14" x 30"	16" x 32"	18" x 36"	20" x 40"	22" x 42"	22" x 48"	24" x 84"
Distance between standards.	20"	24"	30"	34"	36"	38"	42"	48"	54"	60"	96"
Stroke of plunger.	1½"	1½"	2"	2"	2"	2"	2½"	2½"	2½"	3"	5"
Adjustment of plunger.	1"	1"	1"	1½"	1½"	1½"	2"	2"	2"	3"	4"
Diameter of balance wheel.	24"	28"	30"	36"	36"	42"	48"	48"	50"	50"	60"
Face of balance wheel.	3"	3½"	4"	4½"	4½"	5"	6"	6"	6½"	7"	8"
Weight of balance wheel, lbs.	200	250	350	500	800	1,000	1,200	1,200	1,300	1,500	2,000
Speed of balance wheel.	125	100	100	75 to 100	75	50	45	35	30	25	15
Area of bolster plate.											
Bolster plate furnished with press, thickness.	1½"	1¾"	2"	2½"	2½"	3"	3"	3½"	3½"	3½"	4"
Geared presses, diameter of gear.	30"	32"	32"	34"	34"	36"	36"	40"	48"	48"	48"
Proportion of gearing.	5 to 1	5 to 1	5 to 1	5 to 1	6 to 1	6 to 1	6 to 1	6 to 1	7 to 1	8 to 1	10 to 1
Diameter of pulley.	22"	22"	24"	24"	26"	26"	30"	32"	36"	48"	48"
Face of pulley.	3"	3½"	4"	4½"	5"	5"	6"	6"	6"	6"	6"

POWER PRESSES.

STRAIGHT SIDED TRIMMING PRESS.

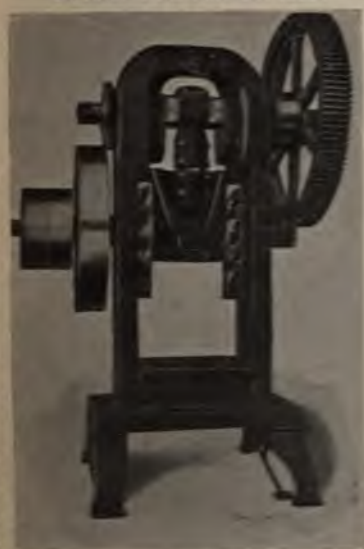


FIG. 1542.

STRAIGHT SIDED TRIMMING PRESS
WITH TRIMMING ATTACHMENT.



FIG. 1543.

SPECIFICATIONS FIGS. 1542 AND 1543.

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No. of Press.	5	6	7	8	9	10	11	12
Weight of press, plain, lbs.	1,500	4,000	5,000	6,000	8,000	10,000	13,000	15,000
Weight of press, geared, lbs.	3,000	4,000	6,000	7,000	9,000	12,000	15,000	15,000
Opening in bed, round.	2"	4"	5"	6"	8"	10"	12"	15"
Distance from bed to plunger when up.	1"	10"	12"	12"	12"	14"	15"	15"
Stroke of plunger.	1"	2 1/2"	3"	3"	3"	4"	4"	4"
Adjustment of plunger.	1"	2"	3"	4"	4"	4"	4"	4"
Width between housings.	10"	10"	10"	12"	12"	16"	20"	20"
Length of plunger.	10"	10"	10"	12"	12"	16"	20"	20"
Size of die bed.	12" x 12"	12" x 12"	12" x 20"	12" x 20"	22" x 22"	24" x 24"	24" x 30"	30" x 30"
Area of plunger.	12" x 12"	9" x 12"	9" x 12"	10" x 12"	12" x 12"	14" x 14"	14" x 18"	18" x 18"
Area of bolster.	12" x 12"	12" x 12"	12" x 20"	12" x 20"	22" x 22"	24" x 24"	24" x 30"	30" x 30"
Height in bolster, round.	2"	3"	3"	3"	3"	3"	3"	3"
Thickness of bolster.	2 1/2"	3"	3"	3 1/2"	3 1/2"	3 1/2"	4"	4"
Distance from floor to bed.	20"	22"	22"	22"	22"	22"	22"	22"
Distance from floor to center of shaft.	20"	22"	22"	22"	22"	22"	22"	22"
Diameter of balance wheel.	12"	20"	20"	20"	20"	20"	20"	20"
Weight of balance wheel, lbs.	200	600	700	900	1,200	1,600	2,000	2,500
Diameter of balance wheel.	4 1/2"	21 1/2"	9"	8 1/2"	7 1/2"	7 1/2"	9"	9"
Diameter of gear.	30"	30"	40"	40"	40"	40"	40"	40"
Proportion of gearing.	5 to 1	6 to 1	7 to 1	7 to 1	8 to 1	8 to 1	8 to 1	8 to 1
Diameter of pulley, when geared.	20" x 8"	22" x 8"	20" x 8"	20" x 8"	24" x 8"	24" x 8"	24" x 8"	24" x 8"

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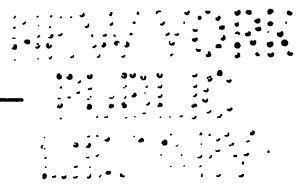
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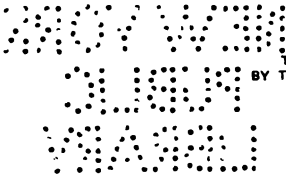
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Our rapidly increasing business in machine tools and machinists' supplies has made it necessary for us to issue this catalogue, which is devoted exclusively to machine tools and wood working machinery suitable for general manufacturing purposes. Scales, valves, power transmission appliances, gas engines, trucks and general supplies are not described in this book, but we have special catalogues treating those subjects, which will be forwarded on request.

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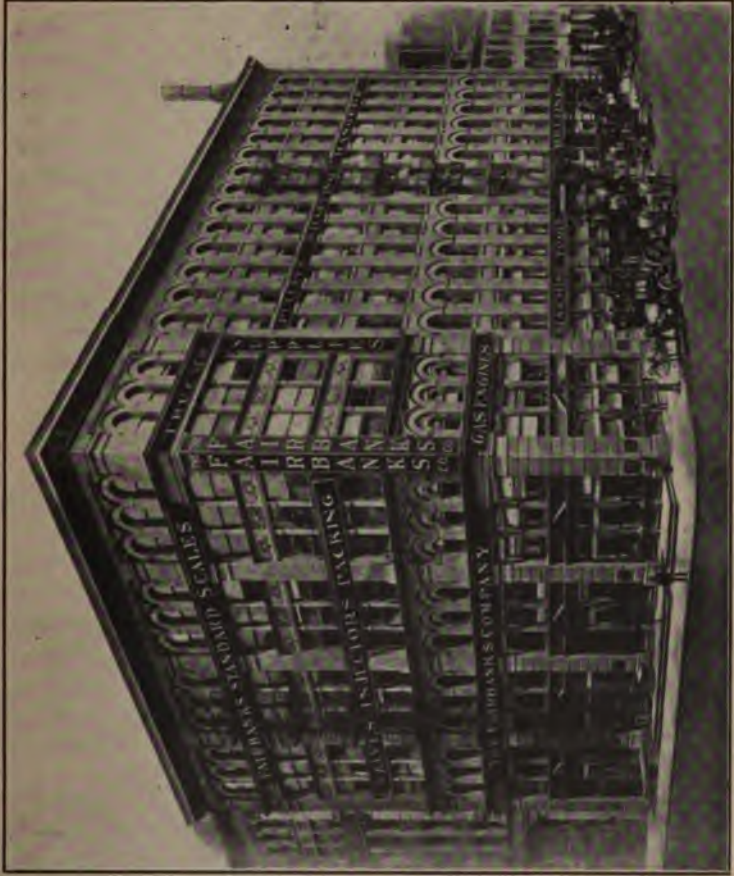
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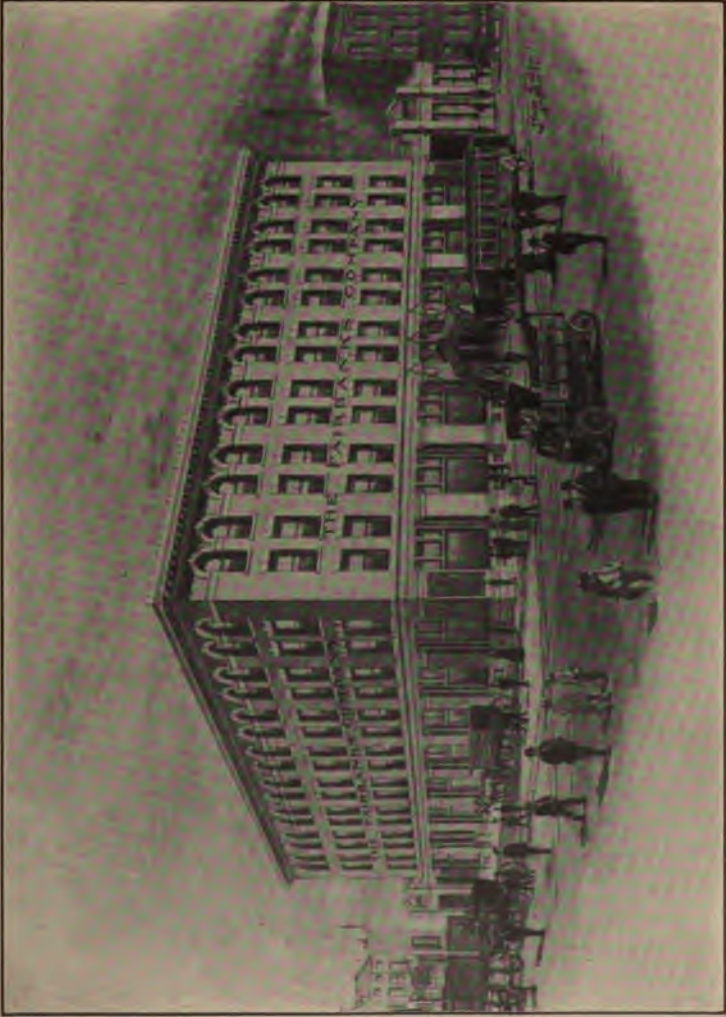




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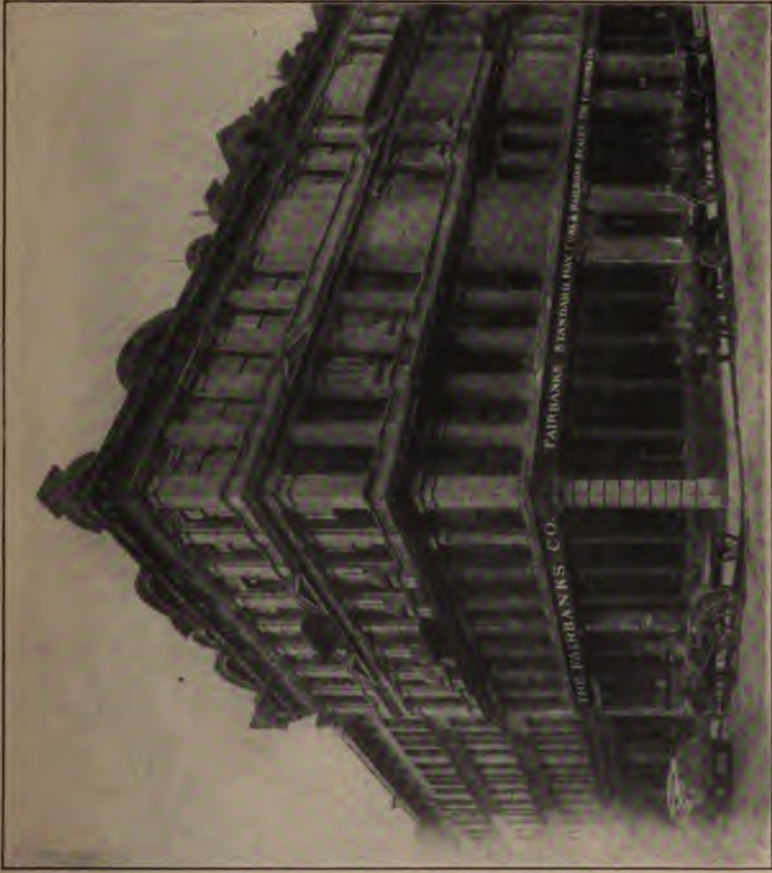
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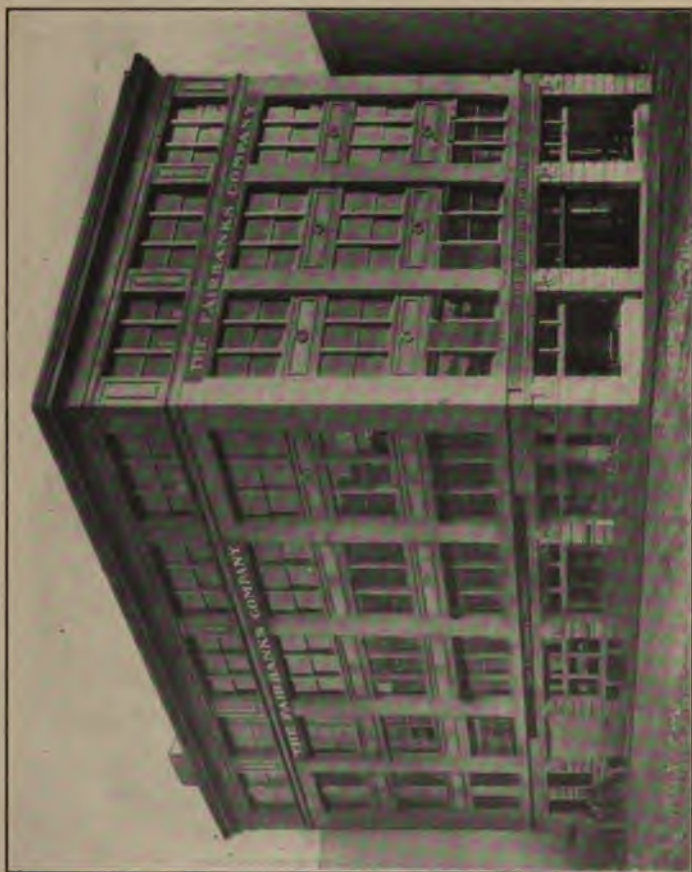
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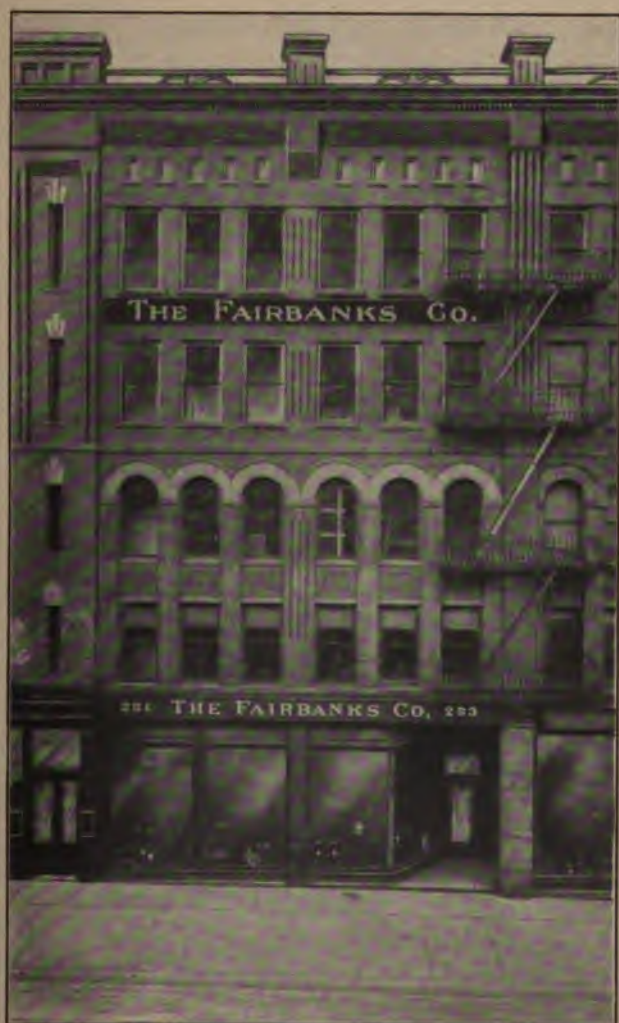
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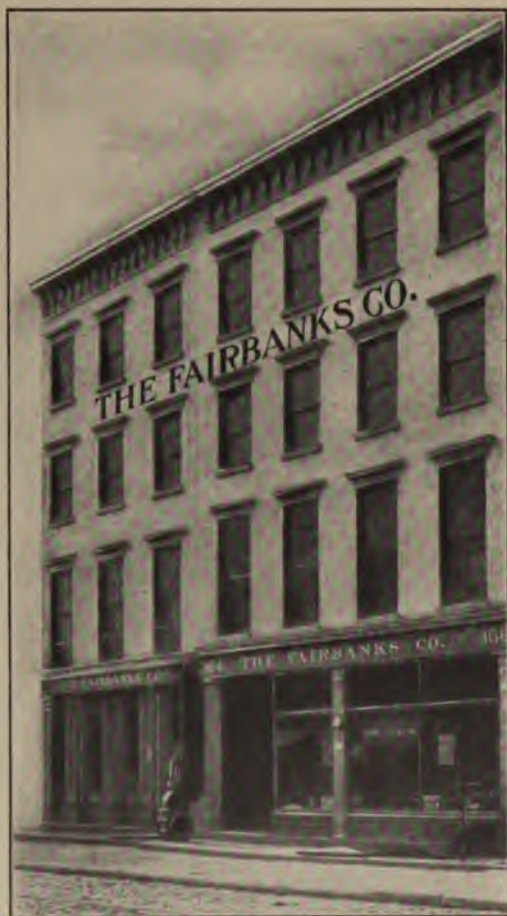
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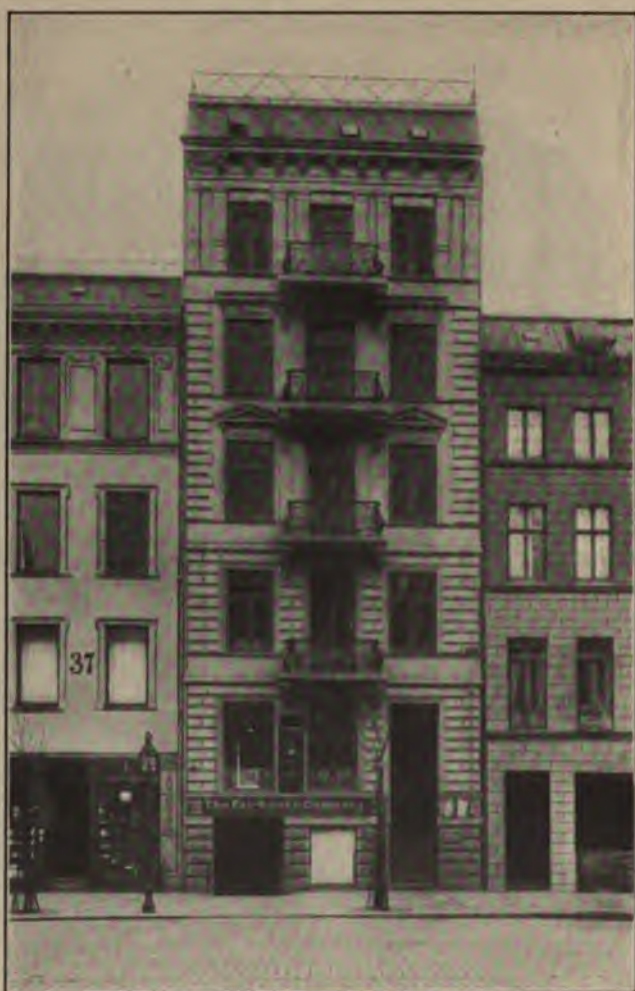
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INDEX.

A.	PAGE
Adjustable Draw Plates	259
" Multiple Spindle Drills	175, 178
" Wire Rools	127
Air Compressors	510, 516
" Drills	522, 525
" Hoses	517, 519
" Riveters	519, 521
Aligner Shears	331, 332
Angle and Face Grinders	171
" Shears	316, 333
Arbor Presses	49
Arbors for Circular Saws	556
Automatic Drop Hammers or Presses	590, 587
" Gear Cutters	229, 230
" Knife Grinders	411, 416
" Saw Sharpeners	115, 116
" Tapping Machines	190, 192
" Threading Lathes	37
" Turret Lathes	38
" Wire Straightening and Cutting Machines	425, 427
Axle Boring Lathe	81
" Lathes	80

B.	PAGE
Back Rest for Wood Lathes	576
Ball Machine	84
Band Re-Saw	567
" Rip Saws	567, 569
" Saw Sharpeners	445
" Saws, Metal	430, 431
" Saws, Wood	559, 570
Bar Cold Saws	414-417
" Shears	314, 315, 321, 330
Beam Punches	320, 320
Belt Hammers	380, 385
" Polishing Machines	501, 505
" Strapping Attachments	501, 505
Bench Drills	136, 137
" Grinders, 429, 434, 435, 437, 447, 482, 487, 492, 493	
" Lathes	1, 45, 51, 54
" Milling Machines	192, 194
" Planer	104
" Shaper	110
" Tapping Machines	188, 189
Bending and Straightening Machine	374
" Machines, Eye	372, 373
" Machines, Tire	372, 373
" Rolls	341, 345
Bevel Gear Cutters	230, 239
Bifid Shears	330
Blacksmith's Drilling Machines	170, 171
Blowers	500-509
Round Drop Hammers	388
Boismaker's Drill	172
Bolches	523-540
Borer Shell Drills	178
Bolt Cutters	251-262
" Cutters, Double Head	358, 359

C.	PAGE
Belt Cutters, Stay	361, 362
" Cutters, Triple Head	360
" Hoisting, Forging, and Upset-ting Machines	367, 370
" Machines, Two	361
" Punchers	362, 363
Bending and Spinning Machine	251
" and Turning Mills	210, 250
" Bars, Cylinder	262, 264
" Bars, for Lathe Work	261
" Drilling and Milling Machines, Horizontal	252, 258
" Lathes	61
" Machines, Connecting Rod	158
" Machines, Cylinder	258, 261
" Machines, Wood	603, 604
Box Board Mather	697
" Body Lathe Chucks	71
" Brass Finisher's Lathes	24
" Broaching Press	499, 505
" Bulb Machines	375, 376
" Bull-Bores	377, 379
" Buzz Planers	377, 379

C.	PAGE
Cabinet Turret Lathes	72, 74, 75
" Cam Power Presses	286
" Car Box Grinder	473
" Wheel Grinder	478
Center Grinders	50, 51
" Grooving Machines	398, 403
" Centers, Milling Machine	193, 194, 209, 210, 213
" Planer	104
" Shaper	114
Centrifugal Oil Separators	91, 92
Chipping Hammers, Pneumatic	521
Chucks, Box Body Lathe	71
" Combination and Universal Lathe	89
" Drill	187, 188
" Geared Scroll	86, 87
" Independent Lathe	85, 86
" Planer	105
" Tapping	185, 186
" Tapping, Machine Crank	359
Circular Plate and Washer Grinder	473
" Shears	312
Coring Machine, Wire	295, 300
Cold Metal Saws	413-419
Combination Cold Saws	419
" Grinding and Polishing Machines	492
" Lathe Chucks	86
" Combined Punches and Shears	316, 317, 320, 321
Compound Slide Rests	48, 78
" Tables for Drill Presses	152, 154
Connecting Rod Boring Machine	178
Continuous Key Way or Splines Cutter	133
Coping Machine	329

PAGE	PAGE
Corlus Valve Seat Portable Boring Bar	263
Countersinking and Drilling Machines	160
Cranks	84
Crank Pin Machines	270, 271
" Pin Presses, Hydraulic	270, 271
" Shafts	110-118
Cut Off Saws, Swing Frame	557, 558
" Oil Saw Tables	541, 543, 550, 555, 559
Cutter, Tool, and Reamer Grinders	448, 455
Cutting Off Machines	404-409
Cylinder Boring Bars	262, 263
" Boring Machines, Horizontal	258-261

D.	PAGE
Deck Engine	538
De Milling Machines	224, 225
" Sletter	127
D-k Grinders	496-496
Davling Heads, Universal	200, 210, 213
Double Arbor Saw Tables	542-546
" Connecting Rod Boring Machine	178
" Head Bolt Cutters	358, 359
" Seaming Machines	221, 222
" Spindle Milling Machines	221, 222
" Spindle Shapers	504, 505
" Surface Planers	386-392
Draw Benches	297, 298
Drawing and Broaching Presses	294
Draw Plates	299
Drill Chucks	187, 188
" Grinders	434-440, 492
Drilling, Boring, and Milling Machines, Horizontal	232-238
" Machines, Blacksmiths'	170, 171
" Machines, Boiler Makers'	172
" Machines, Boiler Shell	176
" Machines, Flexible Shaft	182-184
" Machines, Gang	173-178
" Machines, Multiple Spindle	173-178
" Machines, Portable	179-184
" Machines, Post	170-172
" Machines, Radial	157-169
" Machines, Rail	175
" Machines, Suspension	172
Drill Presses, Bench	136, 137
" Presses, High Speed	114, 145, 155
" Presses, Multiple Spindle	140-145
" Presses, Sensitive	138, 145
" Presses, Vertical	146-156, 173-175
" Press Views	183
Drills, Pneumatic	522, 523
Drop Hammers or Presses	384-388
" Hammers, Steam	379
Duplex Milling Machines	211, 212, 221, 222
" Rotary Planers	110
" Universal Milling Machine	211-213

INDEX.

PAGE	PAGE	PAGE
E.		
Eccentric Mandrel Turning Machine.....	85	
Electric Cranes.....	524-528	
" Grinders.....	493-495, 503, 504	
" Hoists.....	527, 528	
" Portable Drills.....	180-182	
Embossing Presses.....	293	
End Grinder.....	471	
Engine Lathes.....	1-37, 40, 41	
Engines and Boilers.....	529-540	
Exhausters.....	506-509	
Eye Benders.....	370	
" Bolt Machines.....	371	
F.		
Face Grinders.....	470	
" Plate Jaws.....	87	
Facing Arm, Portable.....	264	
" Machine, Nut.....	366	
" Machine, Three Way.....	261	
" Splicer for Use on Boring Bars.....	264	
Feeds for Power Presses.....	292	
Filing Machines.....	306, 307	
Five Wheel Grinder.....	479	
Flattening Mills, Wire.....	300	
Flexible Shaft Drilling Machines.....	182-184	
" Shaft Grinding Plants.....	403	
" Shafts.....	182, 183	
" Shaft Tapping and Reaming Machine.....	184	
Floor Boring Machines.....	255-258	
" Grinders.....	488-491	
Flue Welding Machine.....	337	
Foot Lathes, Screw Cutting.....	42-44	
" Mortiser.....	599	
" Power Hand- or Speed Lathes.....	46, 47	
" Power Squaring Shears.....	304	
" Presses.....	274, 275	
Forges, for Coal and Coke.....	389-391	
" Gas.....	392, 393	
Forging Machines.....	367-370, 375, 376	
Forming Rest for Turret Lathes.....	78	
Foundry Blowers.....	506-509	
Fox Lathes.....	70-74	
Frog and Switch Planers.....	103	
Full Universal Radial Drilling Machines.....	167, 168	
G.		
Gang Drills.....	173-178	
Gap Lathes.....	40, 41	
Gate Shears.....	331	
Gear Cutting Attachment for Lathes.....	44	
" Cutting Machines.....	228-230	
Geared Head Engine Lathes, 4, 14, 16, 17, 24, 28, 34, 37	86, 87	
Grinders.....	50, 51, 429-498	
" Angle and Face.....	471	
" Bench.....	429, 434, 435, 437, 447, 482-487, 492, 493	
" Car Box.....	473	
" Car Wheel.....	478	
" Circular Plate and Washer.....	473	
" Cutter, Tool and Reamer.....	447-445	
" Disk.....	496-498	
" Drill.....	434-440, 492	
Grinders, End.....	471	
" Face.....	470	
" Five Wheel.....	479	
" Flexible Shaft.....	495	
" Floor.....	488-491	
" Guide Bar.....	474	
" Heads, Columns, and Counter- shafts.....	482-491	
" Internal.....	470-481	
" Knife.....	441-445	
" Lathe Center.....	50, 51	
" Piston.....	461	
" Plain.....	437-461	
" Planer Knife.....	441-445	
" Portable Electric.....	493-495	
" Ring Wheel.....	472	
" Roll.....	474-477	
" Saw.....	445-447	
" Spindle and Roll.....	474	
" Surface.....	462-468	
" Swing Frame.....	470	
" Twist Drill.....	434-440, 492	
" Universal.....	456	
" Water Tool.....	429-433	
Grindstones and Frames.....	506	
Guide Bar Grinder.....	474	
H.		
Hack Saws, Power.....	410-412	
Half Universal Radial Drilling Machines.....	166, 167	
Hammers, Automatic Drop.....	386, 387	
" Bell.....	380-388	
" Board Drop.....	388	
" Plain Drop.....	384-386	
" Pneumatic.....	321	
" Power.....	380-383	
" Rotary Blow Riveting.....	394, 395	
" Steam.....	377-379	
Hand Bore Keyseater.....	133	
" Cranes.....	527	
" Feed Gear Cutters.....	232	
" Lathes.....	45-47	
" Milling Machines.....	192-196	
" Planers (Wood).....	577-579	
" Power Hydraulic Wheel Presses, 285-269		
" Punches.....	316-319	
" Shears.....	313-317	
" Wire Cutters.....	423	
Heading Machines, Bolt.....	367-370	
High Speed Drilling Machines.....	144, 145, 155	
" Speed Engine Lathes.....	4, 16, 17, 37	
" Speed Milling Attachment for Milling Machines.....	208	
Hoisting Engines.....	535-538	
Hoists, Air or Pneumatic.....	517-519	
" Electric.....	527, 528	
Hollow Chisel Mortiser.....	601-602	
Horizontal Boring, Drilling, and Mill- ing Machines.....	252-258	
" Boring Machines (Wood).....	604	
" Cylindrical Boring Machines.....	258-261	
" Punching Machine.....	330	
" Steam Engines.....	532-534	
" Tapping Machines.....	188-190	
Hot Metal Saw.....	419	
Hub Mortiser.....	600	
Hydraulic Beam Punch.....	320	
" Crank Pin Presses.....	270, 271	
" Punches.....	319, 320	
Hydraulic Rail Bender.....	272	
" Shaft Straightener.....	272	
" Wheel Presses.....	265-269	
I.		
I Beam Cold Saws.....	418	
Independent Lathe Chucks.....	85, 86	
Index Centers, Milling Machine, 193, 194, 209, 210, 211		
Internal Grinders.....	470-481	
J.		
Jaws, Face Plate.....	87	
Jewelers' Rolling Mills.....	301-303	
Jib Cranes.....	527	
Jig Saws.....	570-572	
Jointers.....	577-579	
K.		
Keyseaters.....	127-133	
" Hand Bore.....	133	
" Shaft.....	132	
Keyseat Milling Machine.....	134, 135	
Key Way or Spline Cutter.....	133	
Knife Grinders.....	441-445	
L.		
Lathe Center Grinders.....	50, 51	
" Chucks, Box Body.....	71	
" Chucks, Combination and Uni- versal.....	86	
" Chucks, Geared Scroll.....	86, 87	
" Chucks, Independent.....	85, 86	
Lathes, Automatic Threading.....	38	
" Automatic Turret.....	77	
" Axle.....	80, 81	
" Bench.....	1, 45, 51-54	
" Boring.....	61	
" Brass Finishers.....	70-79	
" Buffing.....	499-504	
" Cabinet Turret.....	72, 74, 75	
" Foot Power, Hand or Speed.....	46, 47	
" Fox.....	70-74	
" Gap Bed Engine.....	40, 41	
" Geared-Head Engine, 4, 14, 16, 17, 24, 28, 34, 37		
" Hand.....	45-47	
" High Speed Engine.....	4, 16, 17, 37	
" Monitor.....	72-79	
" Pattern Makers.....	572-577	
" Polishing.....	499-504	
" Precision.....	51-54	
" Pulley Turning and Boring.....	82, 83	
" Screw Cutting Engine.....	1-37, 40, 41	
" Screw Cutting, Foot.....	42-44	
" Self-feeding.....	70	
" Shafting.....	39	
" Speed.....	45-47	
" Spindle and Axle Boring.....	81	
" Spinning.....	79	
" Square Arbor.....	70, 71	
" Tool Room.....	13	
" Turret.....	55-77, 88-90	
" Universal Turret.....	55	
" Wood Turners.....	572-577	
Lathe Tools.....	44	

INDEX.

	Page
Chuck Milling Machines.....	217-229
Lathe and Cylinder Boring Bars.....	260, 262
" Driving Bar Planer Tool.....	108

M.

Mandrels for Circular Saws.....	486
Mandrel Turning Machines, Eccentric.....	85
Manufacturers' Gang Drills.....	173-175
Marking Machines.....	428
Masters.....	480-492
Metal Band Saws.....	490, 421
" Saw Tables.....	422
Milling Attachments for Planers.....	108, 107
" Fixture, Quick Index.....	228
" Machine Centers.....	193, 194, 209, 210, 213
" Machine Vices.....	193, 194, 220
" Machines, Bench.....	192-194
" Machines, Die.....	224, 225
" Machines, Duplex.....	211, 212, 221, 222
" Machines, Hand.....	192-198
" Machines, Keyseat.....	134, 135
" Machines, Lincoln.....	217-219
" Machines, Nut.....	196-203
" Machines, Plain.....	305
" Machines, Planer Type.....	220-222
" Machines, Slab.....	222
" Machines, Universal.....	204-207, 211, 212
" Machines, Universal Duplex.....	211-213
" Machines, Valve.....	223, 224
" Machines, Vertical.....	213-217
" Milling Cutting Machines.....	451, 600
" Moulder Lathes.....	73-79
" Mortises, Foot.....	889
" " Hollow Chisel.....	891, 892
" " Rib.....	889
" " Power.....	888-890
" Machines.....	585-598
" Hand Ray Drill.....	178
" Multiple Punching Machines.....	329
" Spindle Drilling Machines.....	173-178

N.

Nut Facing Machine.....	308
" Milling Machine.....	308
" Tapping Machine.....	264, 265

O.

Oil Separator, Centrifugal.....	91, 92
Open Side Planer.....	104, 102

P.

Panel Raiser.....	593
Pattern Makers' Lathes.....	572-577
Peen Cutting Machines.....	228, 230
Pipe Cutters.....	338, 339
" Straighteners.....	339
" Threading and Cutting-Off Machines.....	340-350
Piston Grinders.....	461
Plain Grinders.....	457-461
" Milling Machines.....	196-203
" Radial Drilling Machines.....	157-163
Planer Centers.....	104
" Chucks.....	105
" Knife Grinders.....	441-445

Planer Milling Attachments.....	108, 107
Planers, Bench.....	108
" Frog and Switch.....	99-104
" Open Side.....	101, 108
" Rotary.....	107-110
" Tool Room.....	104
" Valve Seat Rotary.....	110
" Wood.....	577-592
Planer Tools.....	105
" Type Milling Machines.....	220-222
Planing Mill Exhausters.....	607
Plate Bending Rolls.....	334, 335
" Grinder.....	473
" Straightening Rolls.....	336
Pneumatic Chipping Hammers.....	521
" Cranes.....	527
" Drills.....	522, 523
" Hoists.....	517-519
" Riveters.....	519-521
" Riving Hammers.....	521
" Tapping Machines.....	522, 523
" Tools.....	519-523
Pointing Machines, Belt.....	363, 363
Polishing Machines.....	400, 490-505
" Machines, Belt.....	504, 505
" Machines, Swing Frame.....	470
" Machines, Wood.....	613
Portable Planers.....	580
Portable Cylinder Boring Bars.....	262, 263
" Drilling Machines.....	179-184
" Electric Grinders.....	493-495
" Feeders.....	284
" Rotary Planers.....	108
" Shaft Keyseaters.....	132
" Shaft Straightener, Hydraulic.....	272
" Shotters.....	126
" Valve Seat Rotary Planers.....	110
Positive Pressure Blowers.....	508, 509
Post Boring Machine (Wood).....	603
" Drills.....	170-172
Power Hack Saws.....	410-412
" Hammers.....	380-383
" Mortars.....	579-602
" Presses.....	278-286
" Squaring Shears.....	325-329
Precision Lathes.....	51-54
Presses, Arbor.....	40
" Automatic Drop.....	396, 397
" Board Drop.....	398
" Broaching.....	294
" Cam.....	286
" Drawing.....	204
" Embossing.....	293
" Foot.....	274, 275
" Hydraulic.....	265-271
" Plain Drop.....	384-386
" Power.....	278-285
" Screw.....	276, 277
" Sprung.....	285
" Trimming.....	289
" Profiling Machines.....	226, 227
" Pulley Turning and Boring Lathes.....	82, 83
" Punches, Beam.....	320, 329
" " Hydraulic.....	319, 330
" Punching and Shearing Machines.....	304-333
" " Machines, Horizontal.....	330
" " Machines, Multiple.....	329

Q.

Quick Index Milling Fixture.....	228
----------------------------------	-----

R.

Rack Milling Attachments for Milling Machines.....	309
Radial Counterboring and Drilling Machines.....	309
" Drilling Machines, Full Universal.....	167, 169
" Drilling Machines, Half Universal.....	166, 167
" Drilling Machines, Plain.....	157-165
" Drill Tilting or Universal Table.....	169
Radius Planer Attachment.....	106
Rail Bender, Hydraulic.....	272
" Drilling Machine.....	175
Reaming Machine, Flexible Shaft.....	427
Re-saw, Band.....	567
Reversible Centering Machines.....	402
Reversing Tapping Chucks.....	185, 196
Revolving Centering Machines.....	403
Ring Wheel Grinders.....	472
Rip Saw, Band.....	567, 609
" Saw Tables.....	644-646
Riveters, Air or Pneumatic.....	610-621
" Rotary Blow.....	394-395
Riveting Hammers, Pneumatic.....	321
Roller Pipe Cutters.....	398
Roll Grinders.....	474-477
Rolling Mills, Jewelers' and Silversmiths'.....	392-393
" Ribs, Plate Bending.....	394, 395
" Plate Straightening.....	326
Rotary Blow Riveters.....	394, 395
" Compressors or Vacuum Pumps.....	610
" Planers.....	167-110
" Shears.....	326, 321
" Swaging Machines.....	308
" Wire Cutters.....	626
Round Iron Shears.....	314, 316

S.

Sandpapering Machines.....	630-632
Sash Sticker.....	406
Saw Mandrels or Arbors.....	586
Saws, Cold Metal, Cut Off.....	412-419
Saw Sharpening Machines.....	448-447
Saws, Hot Metal.....	419
" Metal Band.....	420, 421
" Power Hack.....	410-412
Saw Tables, Metal.....	422
" Tables, Wood.....	541-598
Screw Cutting Engine Lathes.....	1-37, 40, 41
" Cutting Foot Lathes.....	63-64
" Machines.....	63-69, 90-92
" Presses.....	276, 277
" Slitting Machine.....	91
Scroll Saws.....	570-572
Scoring Machines.....	263
Self-Automatic Gear Cutting Machines.....	228, 231, 232
" Radial Drilling Machine.....	166
Sensitive Drill Presses.....	136-145
Separators, Centrifugal, Oil.....	91, 92
Setover Lathes.....	70
Shaft Keyseaters.....	132
" Straightener, Hydraulic.....	272
Shaping Lathes.....	49
Shaper Centers.....	124
Shapers, Bench.....	110-118
" Crank.....	110-118

INDEX.

	PAGE
Shapers, Sinker Head.....	121
" Traverse Head.....	121-123
" Triple Geared.....	119, 120
" Wood.....	503-505
Shaper Vices.....	124
Sharpeners, Saw.....	445-447
Shears, Alligator.....	331, 332
" Angle.....	316, 333
" Bar Iron.....	314, 315, 324, 330
" Billet.....	330
" Circular.....	312
" Gate.....	331
" Hand.....	313-317
" Rotary.....	310, 311
" Splitting.....	313, 314
" Squaring.....	304-309
" Wire Rope.....	315
Shop Saws, Power.....	410-412
Shrinkers, Tire.....	374
Silversmiths' Rolling Mills.....	301-303
Single Spindle Shaper.....	560
" Surface Planer.....	580-587
Sinker Head Shaper.....	121
Slat Milling Machines.....	222
Slide Rests.....	48, 78
Slotters.....	125-127
" Die.....	127
" Portable.....	126
Slotting Machine, Screw.....	91
Snagging Shaper.....	121
Spacing Tables for Punches and Shears.....	328
Speed Lathes.....	45-47
Spindle and Axle Boring Lathes.....	81
" and Roll Grinder.....	474
Spinning Lathes.....	79
Spline Cutter.....	133
Splining Machine.....	251
Splitting Shears.....	313, 314
Sprue Presses.....	295
Spur Gear Cutters.....	228-230
Square Arbor Lathes.....	70, 71
Squaring Shears, Foot Power.....	304
" Shears, Power.....	305-309
Stay Bolt Cutters.....	361, 362
Steam Engines, Derrick.....	538
" Engines, Hoisting.....	535-538
" Engines, Horizontal.....	532-534
" Engines, Vertical.....	529-532
" Hammers.....	377-379
Steel Foundry Cold Saws.....	417
" Pressure Blowers.....	507
Stock and Shaft Straighteners.....	274, 275
Straighteners, Pipe.....	339
" Wire.....	423-427
Straightening and Bending Machine.....	374

	PAGE
Straightening and Cutting Machines, " Wire.....	423-427
" Rolls.....	336
Strapping Attachments.....	504, 505
Surface Grinders.....	462-468
Surfaces, Wood.....	577-592
Suspension Drilling Machine.....	172
Swaging Machines.....	298
Swing Frame Cut Off Saws.....	557, 558
" Frame Grinding and Polishing " Machines.....	479
Switch Planers.....	103

T.

Tapping and Reaming Machine, Flex- ible Shaft.....	184
" Attachments for Drill Presses, 153, 154	
" Chucks.....	185, 186
" Machines Crank Chucks.....	350
" Machines, Automatic.....	190, 192
" Machines, Bench.....	188, 189
" Machines, Horizontal.....	188-190
" Machines, Nut.....	394, 395
" Machines, Pneumatic.....	522, 523
" Machines, Vertical.....	188-192
Tenoning Machines.....	605-607
Threading Lathes, Automatic.....	38
Three Way Facing Machine.....	261
Tire Benders.....	372, 373
" Shrinkers.....	374
" Welding Hammers.....	383
Tilting Saw Tables.....	542, 543, 546-548
" Table for Radial Drills.....	169
Tool Grinders.....	429-433, 448-455
" Room Lathes.....	13
" Room Planer.....	104
Tools, Air or Pneumatic.....	519-523
" Lathe Turning.....	44
" Planer.....	105
Traverse Head Shapers.....	121-123
Trimmers, Wood.....	608, 609
Trimming Presses.....	289
Trip Hammers.....	380-383
Triple Geared Shapers.....	119, 120
" Head Bolt Cutters.....	360
Trolleys.....	528
Tube Cutters.....	538
Turning Tools for Lathes.....	44
Turret Head Tools.....	88
" Head Vertical Boring and " Turning Mills.....	240-246
" Lathes.....	55-77, 88-90
Twist Drill Grinders.....	434-440, 492
Two Spindle Centering Machines.....	400, 401

U.

Universal Cutter, Tool, and Ream- Grinders.....	448, 4
" Dividing Heads for Milling M- " achines.....	209, 2
" Duplex Milling Machines.....	2
" Grinders.....	2
" Lathes Chucks.....	204-207, 2
" Milling Machines.....	2
" Monitor Lathes.....	2
" Radial Drilling Machines.....	2
" Saw Tables.....	5
" Table for Radial Drills.....	2
" Turret Lathes.....	2
Upright Drill Presses.....	146-150, 1
Upsetting Machines, Bolt.....	3

V.

Vacuum Pumps.....	2
Valve Milling Machines.....	2
" Seat Rotary Planers.....	2
Vertical Boring and Turning Mills.....	2
" Boring Machines (Wood).....	146-150, 1
" Drill Presses.....	146-150, 1
" Milling Machines.....	2
" Spindle Attachments for Mill- " Machines.....	193, 2
" Spindle Rotary Planers.....	2
" Steam Engines.....	5
" Tapping Machines.....	1
Vices, Drill Press.....	193, 1
" Milling Machine.....	193, 1
" Shaper.....	1

W.

Washer Grinder.....	2
Water Attachment for Grinders.....	2
" Tool Grinders.....	4
Welding Machines, Flue.....	2
Wheel Grinders.....	2
Wire Coiling Machines.....	2
" Cutters, Hand.....	2
" Cutters, Rotary.....	2
" Flattening Mills.....	2
" Reels.....	2
" Rope Shear.....	2
" Straighteners.....	2
Wood Polishing Machines.....	2
" Trimmers.....	2
" Turners' Lathes.....	2

9" AND 11" ENGINE LATHES.

DESCRIPTION FIGS. 11000 TO 11002.

These lathes are equally available for use by foot or power and will withstand the severest tests for accuracy, convenience and durability. They contain several patented and special features, giving them important advantages over other lathes of corresponding sizes.

The racks, small gears, studs, screws, etc., are made of steel, and all screws, nuts and small parts liable to become broken are case-hardened. Cylindrical surfaces are ground and sliding surfaces are hand-scraped to insure accuracy.

SPECIFICATIONS.

	9" Lathe	11" Lathe
Hole in head spindle....	4½"	4½"
Diameter in spindle nose	1½"	1½"
Thread on spindle nose..	12 per inch	10 per inch
Front bearing of spindle.	1½" x 2½"	1½" x 3½"
Rear bearing of spindle.	1½" x 1½"	1½" x 1½"
Cone pulley diameters..	3½", 4½", 5½"	3½", 5½", 6½"
Width of belt.....	1½"	1½"
Ratio of back gearing...	7 to 1	8 to 1
Diameter of tail spindle	1"	1¼"
Swing over bed (actual).	10¼"	12¼"
Swing over plain and compound rest.....	5½"	7½"
Compound rest travels..	3¼"	4½"
Size of lathe tools.....	¾" x ¾"	¾" x ¾"
Capacity of center rest..	3"	3½"
Size of pulleys on countershaft.....	6" x 1¼"	8" x 2¼"
Speed of countershaft...	200	200



FIG. 11000.



FIG. 11001.



FIG. 11002.

SPECIFICATIONS.

Number of Lathes.	Rated Swing.	Actual Swing Over Bed.	Distance Between Centers.	Length of Bed.	Floor Space Over All.	Net Weight with Foot Power.	Net Weight with Countershaft.	Net Weight with Countershaft and Oil Pan.	Net Weight with Countershaft and Bench Legs.
10	9"	10¼"	24"	46"	25" x 53"	445 lbs.	370 lbs.	415 lbs.	305 lbs.
20	9"	10¼"	36"	58"	25" x 65"	480 lbs.	405 lbs.	460 lbs.	340 lbs.
25	11"	12¼"	24"	50"	27" x 60"	665 lbs.	590 lbs.	675 lbs.	520 lbs.
30	11"	12¼"	36"	62"	27" x 72"	715 lbs.	640 lbs.	735 lbs.	570 lbs.
40	11"	12¼"	48"	74"	27" x 84"	765 lbs.	690 lbs.	795 lbs.	620 lbs.
30	11"	12½"	60"	86"	27" x 96"	815 lbs.	740 lbs.	855 lbs.	670 lbs.

INDEX.

	PAGE
Shapers, Sinker Head.....	121
" Traverser Head.....	121-123
" Triple Geared.....	119, 120
" Wood.....	593-595
Shaper Vises.....	124
Sharpeners, Saw.....	445-447
Shears, Alligator.....	331, 332
" Angle.....	316, 333
" Bar Iron.....	314, 315, 324, 330
" Billet.....	330
" Circular.....	312
" Gate.....	331
" Hand.....	313-317
" Rotary.....	310, 311
" Splitting.....	313, 314
" Squaring.....	304-309
" Wire Ropes.....	315
Shop Saws, Power.....	410-412
Shrinkers, Tire.....	374
Silversmiths' Rolling Mills.....	301-303
Single Surface Shaper.....	593
" Surface Planers.....	589-587
Sinker Head Shaper.....	121
Slab Milling Machines.....	222
Slide Rests.....	48, 78
Slotters.....	125-127
" Die.....	127
" Portable.....	126
Slotting Machine, Screw.....	91
Snagging Shaper.....	121
Spacing Tables for Punches and Shears.....	328
Speed Lathes.....	45-47
Spindle and Axle Boring Lathes.....	81
" and Roll Grinders.....	474
Spinning Lathes.....	79
Spline Cutter.....	133
Splining Machine.....	251
Splitting Shears.....	313, 314
Sprue Presses.....	295
Spur Gear Cutters.....	228-239
Square Arbor Lathes.....	70, 71
Squaring Shears, Foot Power.....	304
" Shears, Power.....	305-309
Stay Bolt Cutters.....	361, 362
Steam Engines, Derrick.....	538
" Engines, Hoisting.....	535-538
" Engines, Horizontal.....	532-534
" Engines, Vertical.....	529-532
" Hammers.....	377-379
Steel Foundry Cold Saws.....	417
" Pressure Blowers.....	507
Stock and Shaft Straighteners.....	272, 273
Straighteners, Pipe.....	339
" Wire.....	423-427
Straightening and Bending Machine.....	374

	PAGE
Straightening and Cutting Machines, Wire.....	423-427
" Rolls.....	536
Strapping Attachments.....	504, 505
Surface Grinders.....	462-468
Surfaces, Wood.....	577-592
Suspension Drilling Machine.....	172
Swaging Machines.....	298
Swing Frame Cut Off Saws.....	557, 558
" Frame Grinding and Polishing Machine.....	479
Switch Planers.....	103

T.

Tapping and Reaming Machine, Flex- ible Shaft.....	184
" Attachments for Drill Presses, " Chucks.....	153, 154 185, 186
" Machine Crank Chucks.....	350
" Machines, Automatic.....	190, 192
" Machines, Bench.....	188, 189
" Machines, Horizontal.....	188-190
" Machines, Nut.....	364, 365
" Machines, Pneumatic.....	522, 523
" Machines, Vertical.....	188-192
Tenoning Machines.....	605-607
Threading Lathes, Automatic.....	38
Three Way Facing Machine.....	341
Tire Benders.....	372, 373
" Shrinkers.....	374
" Welding Hammers.....	383
Tilting Saw Tables.....	542, 543, 546-548
" Table for Radial Drills.....	169
Tool Grinders.....	429-433, 448-455
" Room Lathes.....	13
" Room Planer.....	104
Tools, Air or Pneumatic.....	519-523
" Lathe Turning.....	44
" Planer.....	105
Traverse Head Shapers.....	121-123
Trimmers, Wood.....	608, 609
Trimming Presses.....	289
Trips Hammers.....	380-383
Triple Geared Shapers.....	119, 120
" Head Bolt Cutters.....	360
Trolleys.....	528
Tube Cutters.....	338
Turning Tools for Lathes.....	44
Turret Head Tools.....	88
" Head Vertical Boring and Turning Mills.....	240-246
" Lathes.....	55-77, 88-90
Twist Drill Grinders.....	434-440, 492
Two Spindle Centering Machines.....	400, 401

U.

Universal Cutter, Tool, and Reamer Grinders.....	448, 450
" Dividing Heads for Milling Ma- chines.....	209, 210,
" Duplex Milling Machines.....	211
" Grinders.....	209, 210,
" Lathe Chucks.....	211
" Milling Machines.....	204-207, 211,
" Monitor Lathes.....	71
" Radial Drilling Machines.....	160
" Saw Tables.....	541
" Turret Lathes.....	541
" Turret Drill Presses.....	146-156, 173
Upsetting Machines, Bolt.....	367

V.

Vacuum Pumps.....	223
Valve Milling Machines.....	223
" Seat Rotary Planers.....	240
Vertical Boring and Turning Mills.....	240
" Boring Machines (Wood).....	240
" Drill Presses.....	146-156, 173
" Milling Machines.....	213
" Spindle Attachments for Milling Machines.....	193, 201,
" Spindle Rotary Planers.....	529
" Steam Engines.....	529
" Tapping Machines.....	188
Vises, Drill Press.....	193, 194,
" Milling Machine.....	193, 194,
" Shaper.....	193, 194,

W.

Washer Grinder.....	429
Water Attachment for Grinders.....	429
" Tool Grinders.....	429
Welding Machines, Flue.....	429
Wheel Grinders.....	429
Wire Coiling Machines.....	399
" Cutters, Hand.....	399
" Cutters, Rotary.....	399
" Flattening Mills.....	399
" Reels.....	399
" Rope Shear.....	399
" Straighteners.....	423
Wood Polishing Machine.....	608
" Trimmers.....	608
" Turners' Lathes.....	572

9" AND 11" ENGINE LATHES.

DESCRIPTION FIGS. 11000 TO 11002.

These lathes are equally available for use by foot or power and will withstand the severest tests for accuracy, convenience and durability. They contain several patented and special features, giving them important advantages over other lathes of corresponding size.

The racks, small gears, studs, screws, etc., are made of steel, and all screws, nuts and small parts liable to become loosened are case-hardened. Cylindrical surfaces are ground and sliding surfaces are hand-scraped to insure accuracy.

SPECIFICATIONS.

	9" Lathe	11" Lathe
Hole in head spindle....	1 1/2"	1 3/4"
Diameter in spindle nose	1 3/8"	1 5/8"
Thread on spindle nose.	12 per inch	10 per inch
Front bearing of spindle.	1 3/8" x 2 1/4"	1 5/8" x 2 3/4"
Rear bearing of spindle.	1 3/8" x 1 5/8"	1 5/8" x 1 3/4"
Coax pulley diameters..	2 3/8", 4 1/8", 5 1/8"	2 3/8", 5 1/8", 6 1/8"
Width of belt.....	1 1/2"	1 3/4"
Ratio of back gearing...	7 to 1	8 to 1
Diameter of tail spindle	1"	1 1/4"
Swing over bed (actual).	10 1/2"	12 1/2"
Swing over plain and compound rest.....	2 1/2"	2 3/4"
Compound rest travels....	3 1/4"	4 1/2"
Size of lathe tools.....	1 1/2" x 3 1/4"	1 3/4" x 3 1/4"
Capacity of center rest...	2"	2 1/4"
Size of pulleys on countershaft.....	6" x 1 1/4"	8" x 2 1/4"
Speed of countershaft...	200	300



FIG. 11000.



FIG. 11001.



FIG. 11002.

SPECIFICATIONS.

Number of Lathes.	Rated Swing.	Actual Swing Over Bed.	Distance between Centers.	Length of Bed.	Flaw Space Over All.	Net Weight with Foot Power.	Net Weight with Countershaft.	Net Weight with Countershaft and Oil Pan.	Net Weight with Countershaft and Bench Legs.
10	9"	10 1/2"	24"	46"	25" x 53"	445 lbs.	370 lbs.	415 lbs.	305 lbs.
20	9"	10 1/2"	36"	58"	25" x 65"	480 lbs.	405 lbs.	460 lbs.	340 lbs.
25	11"	12 1/2"	24"	50"	27" x 60"	665 lbs.	590 lbs.	675 lbs.	520 lbs.
30	11"	12 1/2"	36"	62"	27" x 72"	715 lbs.	640 lbs.	735 lbs.	570 lbs.
40	11"	12 1/2"	48"	74"	27" x 84"	795 lbs.	690 lbs.	795 lbs.	620 lbs.
50	11"	12 1/2"	60"	86"	27" x 96"	815 lbs.	740 lbs.	855 lbs.	670 lbs.

12" SWING ENGINE LATHE.

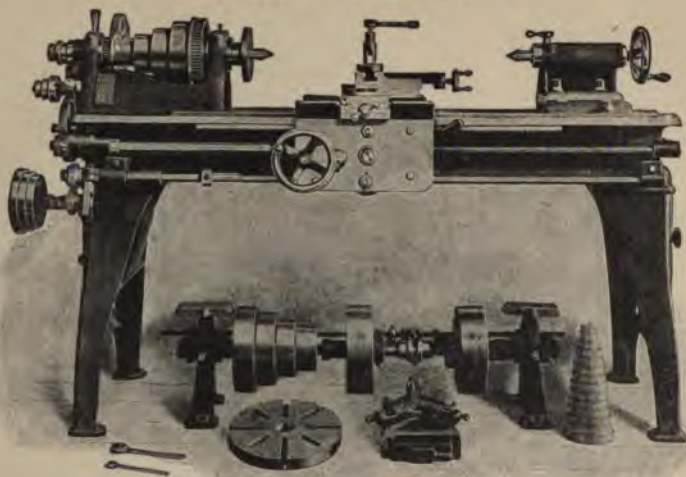


FIG. 11003.

DESCRIPTION FIG. 11003.

The head stock is very rigid. The metal is properly distributed to resist all strains that must be sustained by it. It has a four-step cone, large diameter and with extra wide face.

The spindle is of high carbon steel, ground to size. Bearings are of hard bronze, very large, with proper oiling facilities, and have means for adjustment when necessary.

End thrust of spindle is sustained by a step, firmly bolted to end of head stock, entirely independent of the spindle.

The tail stock is the original of the off-set type (patented), allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole, the tail stock is in keeping with the excellent general character of the machine.

The carriage, which is heavy, has a very stiff bridge, long bearings on Vs, and is securely gibbed to the bed. The compound or plain blocks are very wide and generously proportioned.

The apron is bolted firmly to the carriage. All gears in apron are amply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage travels back and forth on bed.

Feed works. Three changes of belt feed can be had by means of the three-step cone. Three other changes are made by changing gears, making in all nine changes of feed.

The bolt tightener keeps the feed belt always taut.

Positive geared feed is supplied with each lathe. To use the same it is only necessary to swing the belt tightener up, so that the gear on the hub of feed cone meshes with gear which runs loose on splined bushing which is on lead screw; the number of feed changes to be had is limited only to the number of change gears with lathe.

The lead screw is large, of coarse pitch and accurate, and is rotated only when screw-cutting.

Automatic stop for feed disengages clutch on feed rod.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

SPECIFICATIONS.

Diameter of front bearing, $1\frac{3}{8}$ "
 Length of front bearing, $3\frac{3}{4}$ "
 Diameter of rear bearing, $1\frac{1}{4}$ "
 Length of rear bearing, $2\frac{3}{4}$ "
 Diameter of spindle nose, $1\frac{1}{2}$ " x 10 threads per inch.
 Diameter of hole in spindle, $\frac{5}{8}$ ", conforms to Morse taper.
 Swings over ways, 13"
 Swings over compound rest, 9"
 Swings over rise and fall rest, 7"
 Distance between centers, 5' bed, 20".

Change gears cut from 5 to 32 threads.
 Width of cone belt, $1\frac{3}{8}$ "
 Largest diameter of cone, $9\frac{1}{4}$ "
 Diameter of counter pulley, 9"
 Face of counter pulleys, $2\frac{1}{4}$ "
 Speed of countershaft, 220 R. P. M.
 Weight, 5' bed, 850 pounds.
 Weight boxed, 5' bed, 970 pounds.
 Cubic feet, 28.

12" SWING ENGINE LATHE WITH COMPOUND REST AND POWER CROSS FEED.

DESCRIPTION FIG. 11004.

Swing over bed, 12½".
 Swing over raise and fall rest, 7".
 Swing over compound rest, 7½".
 Swing over plain rest, 8".
 Diameter of hole through spindle, ¾".
 Center hole in spindles, Morse taper No. 2.
 Face plate screw, 1½", 10 threads.
 Size of tools, ¾" x ¾" steel.
 Size of pulleys on countershaft, 5" x 3".
 Speed of countershaft, 150 R. P. M.
 Distance between centers, with 4' bed, 24".
 Distance between centers, with 5' bed, 36".
 Distance between centers, with 6' bed, 48".
 Net weight, with 4' bed, 580 lbs.; boxed, 730 lbs.
 Net weight, with 5' bed, 640 lbs.; boxed, 800 lbs.
 Net weight, with 6' bed, 700 lbs.; boxed, 875 lbs.
 Made with any style rest.
 Can be furnished with foot power.
 Taper attachment, with plain or compound rest, extra.



FIG. 11004.

13" AND 14" ENGINE LATHES WITH COMPOUND REST AND POWER CROSS FEED.

DESCRIPTION FIG. 11005.

The lathe is furnished complete with either plain, raise and fall or compound rests, independent rod and screw feed, large and small face plates, full set of screw-cutting gears, steady rest, friction countershaft and wrenches. Improved taper attachment can also be furnished when desired at extra cost. Taper attachment or power cross feed will not be furnished with raise and fall rest.

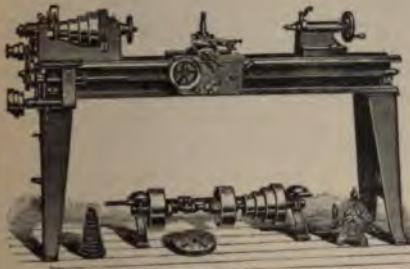


FIG. 11005.

SPECIFICATIONS.

	13"	14"
Swing over bed.....	14"	16"
Swing over compound rest.....	8"	9"
Swing over plain rest.....	8"	9"
Diameter of hole through spindle.....	¾"	1½"
Center hole in spindle, Morse taper.....	No. 3	No. 3
Face plate screw, threads.....	6	6
Face plate screw, diameter.....	1½"	2"
Distance between centers, 6' bed.....	42"	42"
Front bearing.....	15 5/8" x 3 1/2"	2 1/2" x 4"
Rear bearing.....	13 1/4" x 3 1/4"	1 7/8" x 3 1/4"
Four-step cone for belt, diameter.....	2"	2 1/2"
Diameter largest step on cone.....	7 1/4"	8 5/8"
Diameter smallest step on cone.....		3 5/8"
Ratio of back gearing.....	9 to 1	10 to 1
Diameter of tail stock spindle.....	1 1/2"	1 3/4"
Cuts threads, with English lead screw, from.....	4 to 40	4 to 36
Cuts threads, with metric lead screw, from.....	8 mm. to 0.75 mm.	8 mm. to 1.5 mm.
Net weight, with 6' bed.....	1,035 lbs.	1,468 lbs.
Net weight per extra foot of bed.....		75 lbs.
Pulleys on countershaft, diameter.....	8"	10"
Pulleys on countershaft, face.....	2 1/2"	3"
Speed of countershaft, revolutions per minute.....	150	150
Tools should be made of steel, size.....	1" x 1 1/2"	1" x 1 1/2"

12" AND 14" SWING HIGH-SPEED LATHES.

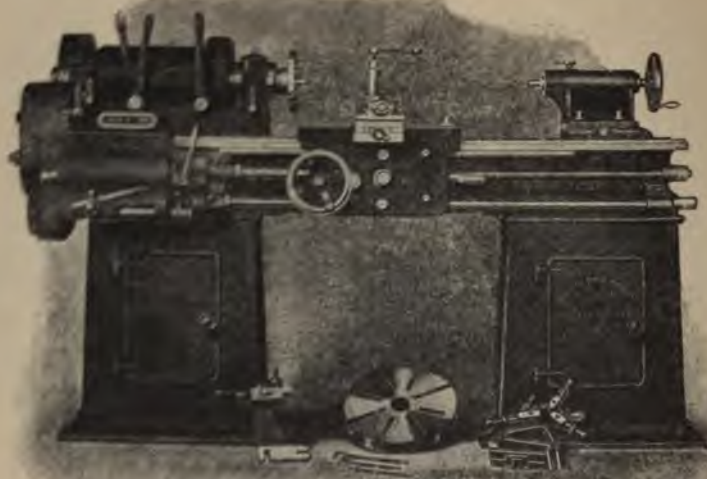


FIG. 11006. (CUT SHOWS 14".)

DESCRIPTION FIG. 11006.

The head stock is massive, with large spindle bearings, and is self-oiling throughout. Driving pulley is located on back shaft and drives the spindle by means of gearing. There are eight changes of spindle speed, all of which may be obtained while the lathe is in motion.

Friction clutches of our special design are employed, enabling these changes of speed to be made without shock or danger to the gears. It is impossible to engage two conflicting ratios of gearing at the same time. The belt power is constant and will transmit at least 15 horse-power. This is the correct principle, as it gives a maximum power at any speed of the spindle.

The quick-change gear mechanism permits of a change from one lead to another, or from one thread to another, instantly. An index plate on the head stock makes the screw-cutting changes so simple that even an inexperienced hand can operate without trouble or mis-lead.

The end thrust of spindle is sustained by a stop, firmly bolted to end of the head stock, entirely independent of the spindle bearings. The tail stock is the original of the offset type, allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole this tail stock is in keeping with the excellent general character of the machine.

The carriage is very rigid, and the bridge is especially stiff, with long bearings on V's, and is securely gibbed to the bed. The gears are bolted rigidly to the carriage, and all gears are amply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage traverses back and forth on bed.

The lead screw is large and coarse pitch and accurate, and is rotated only when screw-cutting.

Automatic stop for lead screw clutch on feed rod.

The compound on plain blocks are very wide and generously proportioned.

When equipped with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor; gears for driving any odd thread not included in regular equipment.

Extra photos, large and small, motor and followers rest, countershaft with two friction pulleys, and wrenches, are supplied with each lathe.

SPECIFICATIONS.

	12"	14"	12"	14"
Diameter of drive bearing.....	4"	5"	4 to 60	4 to 60
Length of drive bearing.....	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Diameter of rear bearing.....	3 1/2"	4 1/2"	10"	12"
Length of rear bearing.....	1 1/2"	1 1/2"	12"	12"
Diameter of cone of spindle.....	3 1/2"	4 1/2"	3"	3"
Male to female.....	1 1/2"	1 1/2"	350	350
Swing over stock.....	11 1/2"	11 1/2"	1,550 lbs.	1,750 lbs.
Swing over counter-shaft.....	11 1/2"	11 1/2"	1,900 lbs.	2,150 lbs.
Clearance over and 1/2" over.....	11 1/2"	11 1/2"	27	45
Reference literature complete, 5' list.....	20 1/2"	20 1/2"		

THE FARRBANKS COMPANY

13", 14" AND 15" ENGINE LATHES.

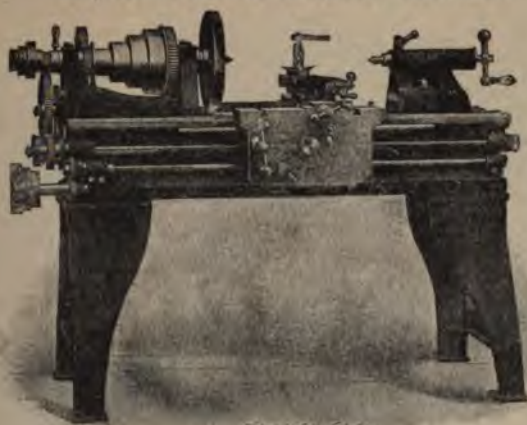


FIG. 11007.

DESCRIPTION FIG. 11007.

These lathes are of the latest and most approved design. The workmanship, material, and finish are of the highest order throughout. They are in fact modern, practical, high grade tools at low prices.

All parts are heavy and substantial, fittings are accurate and appliances convenient.

The live spindles are made of a high grade of special steel; the boxes or bearings are of the best phosphor bronze. Provision is made for constant and easy lubrication.

The tail stocks have an adjustable side movement for turning tapers. They are solid and substantial, having a heavy spindle and center.

The carriages are of the most approved design, have long bearings on the ways, and are provided with ample lubricating devices. They are gibbed to the bed, both front and back. These lathes will cut either right or left hand threads, or feed either right or left.

These lathes are provided with plain rest unless otherwise directed, and with both screw and rod feeds, as well as power cross feed. The cross feed is graduated. Gears to cut all standard threads from 5 to 36 are furnished. Steady and follower rests, large and small face plates and friction countershaft go with each lathe.

Compound rest or rise and fall rest can be furnished instead of plain block rest, at additional cost.

Lathes can be provided with taper attachment, if desired.

SPECIFICATIONS.

	13"	14"	15"
Swings over bed.....	13"	14"	15"
Swings over carriage.....	7½"	8½"	9½"
Length of bed.....	6'	6'	6'
Takes between centers.....	40"	40"	40"
Front bearing.....	2½" x 3½"	2½" x 3½"	2½" x 3½"
Hole through spindle.....	1½"	1½"	1½"
Countershaft pulleys.....	6"	9" x 3"	9" x 3"
Speed of countershaft pulleys, R. P. M.....			190
Weight.....			1,250 lbs.

12" AND 14" SWING HIGH-SPEED LATHES.

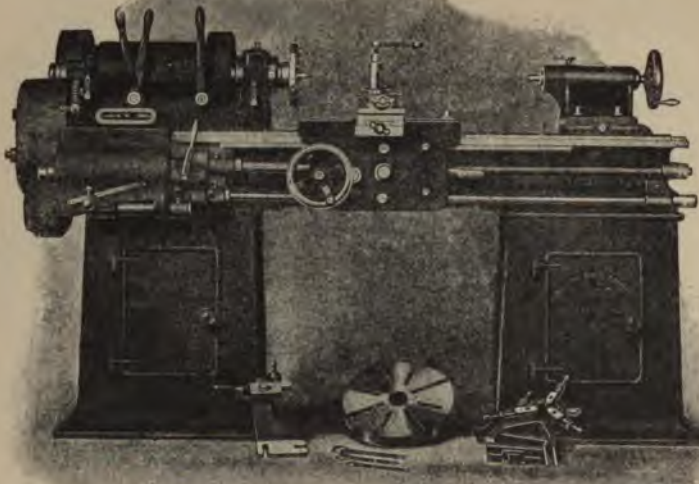


FIG. 11006. (CUT SHOWS 14".)

DESCRIPTION FIG. 11006.

The head stock is massive, with large spindle bearings, and is self-oiling throughout. Driving pulley is located on back shaft and drives the spindle by means of gearing. There are eight changes of spindle speed, all of which may be obtained while the lathe is in motion.

Friction clutches of our special design are employed, enabling these changes of speed to be made without shock or danger to the gears. It is impossible to engage two conflicting ratios of gearing at the same time. The belt power is constant and will transmit at least 15 horse-power. This is the correct principle, as it gives a maximum power at any speed of the spindle.

The quick-change gear mechanism permits of a change from one feed to another, or from one thread to another, instantly. An index plate on the head stock makes the screw-cutting changes so simple that even an inexperienced hand can operate without trouble or mistakes.

The end thrust of spindle is sustained by a step, firmly bolted to end of the head stock, entirely independent of the spindle bearings. The tail stock is the original of the offset type, allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole this lathe stock is in keeping with the excellent general character of the machine.

The carriage is very rigid, and the bridge is especially stiff, with long bearings on V's, and is securely gibbed to the bed. The apron is bolted rigidly to the carriage, and all gears are amply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage traverses back and forth on bed.

The lead screw is large and coarse pitch and accurate, and is rotated only when screw-cutting. Automatic stop for feed disengages clutch on feed rod.

The compound or plain blocks are very wide and generously proportioned. When specified with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor; gears for cutting any odd thread not included in regular equipment.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches, are supplied with each lathe.

	SPECIFICATIONS.			12"	14"
	12"	14"			
Diameter of front bearing.....	4"	5"	Will cut 44 pitches from.....	4 to 60	4 to 60
Length of front bearing.....	2 3/8"	2 1/2"	Width of driving belt.....	2 1/4"	2 1/4"
Diameter of rear bearing.....	2 3/8"	3"	Diameter of driving pulley.....	10"	12"
Length of rear bearing.....	1 3/8"	1 3/8"	Diameter of counter friction pulleys.....	12"	12"
Diameter of nose of spindle.....	2 1/2"	2 1/2"	Face of counter pulley.....	3"	3"
Hole in spindle.....	1 1/4"	1 1/4"	Speed of countershaft, R. P. M.....	350	360
Swings over ways.....	13 1/4"	15 1/4"	Weight, 6' bed.....	1,550 lbs.	1,780 lbs.
Swings over compound rest.....	8 1/4"	10"	Weighted boxed, 6' bed.....	1,900 lbs.	2,150 lbs.
Over raise and fall rest.....	6 1/2"	7 1/2"	Cubic feet.....	37	45
Distance between centers, 6' bed.....	33"	29 1/2"			

13", 14" AND 15" ENGINE LATHES.

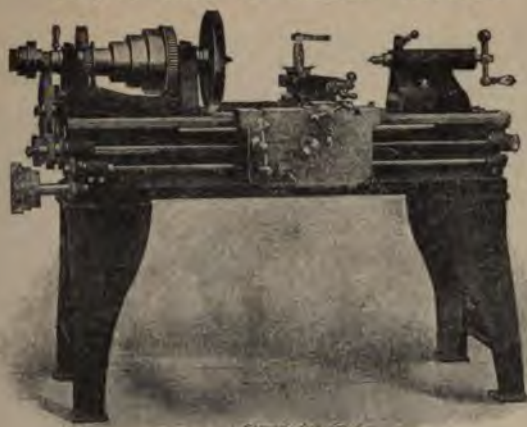


FIG. 11007.

DESCRIPTION FIG. 11007.

These lathes are of the latest and most approved design. The workmanship, material, and finish are of the highest order throughout. They are in fact modern, practical, high grade tools at low prices.

All parts are heavy and substantial, fittings are accurate and appliances convenient.

The live spindles are made of a high grade of special steel; the boxes or bearings are of the best phosphor bronze. Provision is made for constant and easy lubrication.

The tall stocks have an adjustable side movement for turning tapers. They are solid and substantial, having a heavy spindle and center.

The carriages are of the most approved design, have long bearings on the ways, and are provided with ample lubricating devices. They are gibbed to the bed, both front and back. These lathes will cut either right or left hand threads, or feed either right or left.

These lathes are provided with plain rest unless otherwise directed, and with both screw and rod feeds, as well as power cross feed. The cross feed is graduated. Gears to cut all standard threads from 5 to 36 are furnished. Steady and follower rests, large and small face plates and friction countershaft go with each lathe.

Compound rest or rise and fall rest can be furnished instead of plain block rest, at additional cost.

Lathes can be provided with taper attachment, if desired.

SPECIFICATIONS.

	13"	14"	15"
Swings over bed.....	13"	14"	15"
Swings over carriage.....	7½"	8½"	9½"
Length of bed.....	6'	6'	6'
Travel between centers.....	40"	40"	40"
Front bearing.....	2½" x 3¼"	2½" x 3¼"	2½" x 3¼"
Hole through spindle.....	1½"	1½"	1½"
Countershaft pulleys.....	9" x 3"	9" x 3"	9" x 3"
Speed of countershaft pulleys, R. P. M.....	190	190	190
Weight.....	1,150 lbs.	1,200 lbs.	1,250 lbs.

13", 15", 16", 18" AND 20" ENGINE LATHES.

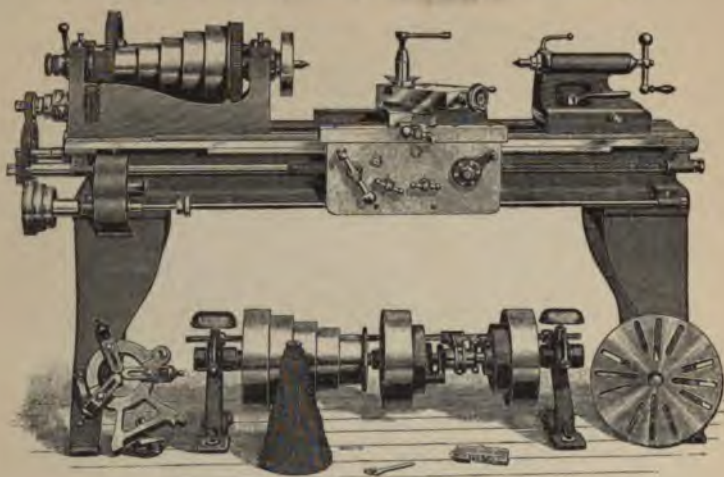


FIG. 11008.

DESCRIPTION FIG. 11008.

This cut shows the 15" engine lathe, with compound rest and all regular attachments. It is a convenient, accurate lathe, made by first-class workmen from the best of materials.

Both spindles are of cast crucible steel, the head spindle having a large hole through its entire length. The bearings of the head spindle are of the best phosphor bronze, carefully scraped to fit. The head is strongly back-gearcd.

The compound swivel is graduated in degrees, and all the actuating screws are provided with graduation for adjustment. The tool post is a solid steel forging, and is fitted with a tool steel screw. The rest is very stiff and is gibbed to the bed, both front and back sides. All bearings on ways are of ample length, and carefully scraped to fit.

This lathe is regularly furnished with power cross feed, automatic stop to carriage, belt feed and geared rod feed; also rim friction countershaft, large and small face plates, center rest, set of change gears, necessary wrenches, etc.

Plain or elevating rest furnished when desired. Taper attachment can be furnished with compound rest. Draw-in chuck for tool-room work can be furnished when ordered.

Countershaft has self-oiling boxes, and the friction pulleys can be oiled while running.

Metric pitch lead screw and gears for cutting metric threads furnished without extra charge when ordered.

The lathe can be furnished mounted in oil pan, at an extra charge.

Each lathe is carefully tested before being shipped.

Beds of any length.

SPECIFICATIONS.

	13"	15"	16"	18"	20"
Swing over ways	13½"	16"	17½"	18½"	20½"
Swing over compound rest.....	8½"	9½"	11¼"	10¾"	12¾"
Swing over plain rest.....	8½"	10½"	11¼"	10¾"	12¾"
Length of bed.....	5'	6'	8'	8'	8'
Distance between centers.....	20"	22½"	50"	47½"	47½"
Countershaft pulleys.....	10" x 3"	11" x 3"	11" x 3½"	13" x 3¾"	13" x 3¾"
Speed of countershaft, R. P. M.....	160	130	120	115	115
Weight.....	1,165 lbs.	1,150 lbs.	2,000 lbs.	2,530 lbs.	2,800 lbs.
Hole in spindles.....	1½"	1½"	1½"	1½"	1½"

14", 16" AND 18" ENGINE LATHES.

DESCRIPTION FIG. 11000

These machines have been carefully designed to meet all the requirements exacted of modern machine tools and are equipped with every convenience conducive to economical manufacturing and without being burdened with useless and trappy notions.

Head stocks are neat in appearance and of sufficient mass to entirely obviate any tendency to chatter under the heaviest cuts.

Spindles are crucible steel of large diameter ground perfectly cylindrical, running in self-oiling bronze bearings of large proportions. Centers correspond to 2, 3 and 4 Morse taper.

Nose of spindles are very large and substantial, provided with Acme standard threads. The use of Acme standard thread on nose of spindle produces a much more rigid nose and is less liable to injury.

All gears are covered with neatly designed guards.

Tail stocks are very massive and of a pleasing form, cut back on the front side to permit compound rest being swung parallel with bed; susceptible of side adjustment for taper turning and clamped to bed with two heavy bolts; spindles are large in diameter fitted with 2, 3, and 4 Morse taper centers.

Carriages are of unusual length with full bearings upon a V in front and broad flat in the rear and are gibbed to outside of bed. Cross feed screws have micrometer collars, reading to .001", and an effective clamp is conveniently located for carriage when facing.

Compound rests are of an exceptionally heavy pattern furnished with taper gib to take up wear. Screws have a micrometer collar reading to .001". The bases are graduated to degrees and are securely clamped with one screw, when swiveled at any angle.

Aprons are double, furnishing two bearings for all studs. Rack pinions have a bearing supporting them close up to rack and may be withdrawn when screw-cutting. It is impossible to engage lead screw when cross or longitudinal feeds are in use, or vice versa. Directions of feeds are reversed in apron.

Feeds are all positive, being driven through the regular change gears. A range of six feeds for every thread cut is provided. The finest is six times finer than the coarsest, thus a finishing and roughing feed is always at hand without removing a single gear.

Left-hand threads. A reverse in the head operated by a small handle, seen near index plate, makes an extra quadrant and intermediate gear with all of its appurtenances unnecessary and provides a reverse for feeds as well.

An automatic stop for carriage in either direction is provided.

Beds are unusually heavy and braced internally with box girts. Spots for lead screw boxes are planed with a tongue insuring perfect alignment. All parts subject to abrasion are case-hardened.

Screws, racks and small gears are made of steel. Flat surfaces are carefully scraped to bearing with surface plates, and cylindrical surfaces ground true.

New and improved taper attachment is furnished, with which tapers up to 4° to the foot may be accurately turned.

Countershafts are fitted with friction pulleys of our latest pattern, which operate easily and almost positively. Oiling may be accomplished without stopping or removing belts.

Each lathe is furnished with large and small face plates, steady rest, follow rest, and change gears necessary to cut nearly all threads inclusive of 11½ for pipe thread, countershaft and wrenches complete.

The material used throughout is the best obtainable for each purpose, and the workmanship as good as skill in connection with the best facilities can make it.

Any desired length of bed can be furnished.

Blue prints, showing floor plans for each machine, furnished on application.

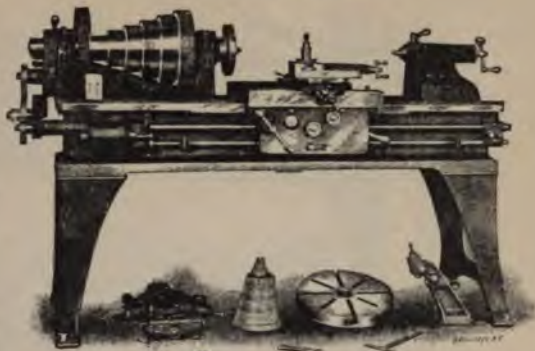


FIG. 11000

SPECIFICATIONS

	14"	16"	18"
Front bearing of spindle.....	2½" x 4"	2½" x 4½"	3¼" x 5½"
Back bearing spindle.....	2" x 3"	2¼" x 3½"	2½" x 4"
Hole through spindle.....	1½"	1½"	1½"
Nose of spindle.....	2½" diameter 1½" long	2½" diameter 2" long	2½" diameter 2½" long
Cone diameter head stock.....	10", 8¼", 6¾", 5¼", 3½"	11", 9¼", 7½", 5¾", 4"	12", 10½", 8½", 6½", 4½"
Width of belt.....	2"	2½"	2½"
Ratio of back gearing.....	11	10	13
Diameter of tail-stock spindle.....	1½"	1½"	1½"
Cuts screws from.....	2 to 36	2 to 36	1 to 20
Actual swing over bed.....	15"	17"	19"
Actual swing over carriage.....	9½"	10½"	12"
6' lathe takes between centers.....	3' 10"	2' 6"	2'
Speed of countershaft, revolutions per minute.....	150	150	120
Friction pulleys countershaft.....	10" diameter for 3½" belt	10" diameter for 3½" belt	12" diameter for 4" belt
Net weight of lathe with 6' bed.....	1,600 lbs.	2,100 lbs.	2,600 lbs.
Shipping weight crated, domestic.....	1,750 lbs.	2,250 lbs.	2,800 lbs.
Shipping weight additional per foot.....	100 lbs.	135 lbs.	175 lbs.
Weight boxed for foreign shipment.....	1,900 lbs.	2,400 lbs.	2,900 lbs.
Dimensions, boxed.....	85" x 35" x 29"	85" x 36" x 32"	
Taper attachment furnished to order turns taper up to 4° per foot.....	18" long	18" long	

14", 16" AND 18" DOUBLE BACK GEARED LATHES.

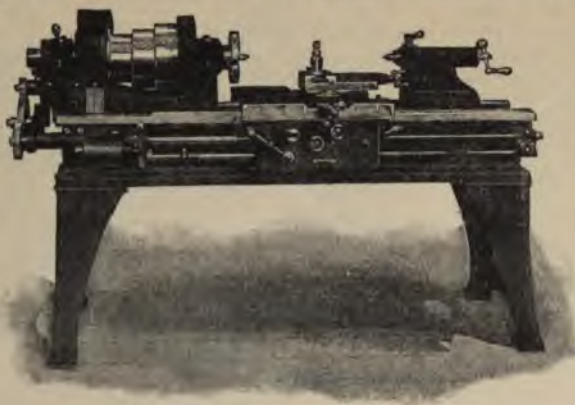


FIG. 11010.

DESCRIPTION FIG. 11010.

The above illustration is that of our new standard engine lathes, with three-step cone, and double-back gears. This lathe possesses advantages of unusual interest to modern, up-to-date manufacturers, as a cost reducer on either heavy or light work, within the capacity of the lathe.

The cone has three steps of large diameters, with very broad faces; reference to specifications below giving each particular size, also width of belt required, which in connection with the double-back gears, having ratios of 3 to 1, and $9\frac{1}{2}$ to 1, delivers power to the spindle sufficient to allow it to take care of the heaviest work within its range, and without impairing its utility for turning out work rapidly, and of the very finest character.

The spindles are large in diameter, running in ring oiling bearings, which may be replaced with new ones, in case of accidental damage, and maintain their original alignment—a feature which should not be underestimated.

Since modern high-speed steels call for very high speeds, and heavy lathes in proportion—this lathe is especially built for said requirements.

The spindles have large holes throughout their entire length, making it possible to operate upon long bars.

Three-step cone, double-back gears, and a two speed countershaft provides a very satisfactory range of 18 spindle speeds; thus giving the advantage of eight more speeds than with the usual five-step cone, in addition to twice as much power.

Other advantages in addition to the abundance of power in the head are its positive geared feeds, with a range to suit any and all conditions; arranged in such a manner that any of the six changes of feeds, from the finest to the coarsest, are at the operator's immediate and instantaneous command.

As an illustration: a roughing feed of $\frac{3}{8}$ of an inch is in use, and a finishing feed is wanted—push the lever, and a feed three to four times as fine is at hand. Should the range within the feed box be insufficient, a change of gear on the lead screw will make another change of six feeds. This may be carried out in an unlimited number of combinations.

The carriage, apron, compound rest, tail stock, steady and follower rests, taper attachment and countershaft, are all of modern and standard design, heavy and rigid, the bed is extra deep, wide and heavy.

These lathes can be furnished with English or metric lead screw ideal rapid change gear device, oil pan, tank and pump.

SPECIFICATIONS.

	14"	16"	18"
Front bearing of spindle.....	$2\frac{1}{2}'' \times 4''$	$2\frac{3}{4}'' \times 4\frac{1}{2}''$	$3\frac{1}{2}'' \times 5\frac{1}{2}''$
Back bearing spindle.....	$2'' \times 3''$	$2\frac{1}{2}'' \times 3\frac{1}{2}''$	$2\frac{1}{2}'' \times 3''$
Hole through spindle.....	$1\frac{1}{2}''$	$1\frac{1}{2}''$	$1\frac{1}{2}''$
Nome of spindle.....	$2\frac{1}{8}'' \times 1\frac{1}{2}''$	$2\frac{1}{4}'' \times 2''$	$2\frac{3}{4}'' \times 2\frac{1}{4}''$
Cone diameter head stock.....	$10\frac{1}{2}''$, $8\frac{3}{4}''$, $7\frac{1}{4}''$	$11''$, $9\frac{1}{4}''$, $7\frac{1}{2}''$	$12\frac{1}{4}''$, $10\frac{1}{2}''$, $8\frac{1}{4}''$
Width of belt.....	$2\frac{3}{8}''$	$3\frac{1}{8}''$	$3\frac{3}{8}''$
Ratio of back gearing.....	3 to 1 and 9 to 1	3 to 1 and $9\frac{1}{2}$ to 1	3 to 1 and $9\frac{1}{2}$ to 1
Diameter of tail stock spindle.....	$1\frac{1}{2}''$	$1\frac{1}{2}''$	$2''$
Cuts screws from.....	3 to 36	2 to 36	1 to 20
Actual swing over bed.....	$15''$	$17''$	$19''$
Actual swing over carriage.....	$9\frac{1}{2}''$	$10\frac{1}{2}''$	$12''$
6" lathe takes between centers.....	$2''$ $10''$	$2''$ $5''$	$2''$
Speed of countershaft, revolutions per minute.....	165 and 145	160 and 140	140 and 120
Friction pulleys, countershaft.....	12" diameter, 3" belt	13" diameter, $3\frac{1}{2}''$ belt	14" diameter, 4" belt
Net weight of lathe with 6" bed.....	1,600 lbs.	2,100 lbs.	2,600 lbs.
Shipping weight crated, domestic.....	1,750 lbs.	2,250 lbs.	2,800 lbs.
Shipping weight, additional per foot.....	100 lbs.	135 lbs.	175 lbs.
Weight, boxed for foreign shipment.....	1,900 lbs.	2,400 lbs.	2,900 lbs.
Dimensions, boxed.....	$85'' \times 35'' \times 29''$	$85'' \times 36'' \times 32''$	$85'' \times 40'' \times 34''$
Taper attachment furnished to order turns tapers up to 4" per foot.....	18"	18"	24"

14" AND 16" SWING ENGINE LATHES.

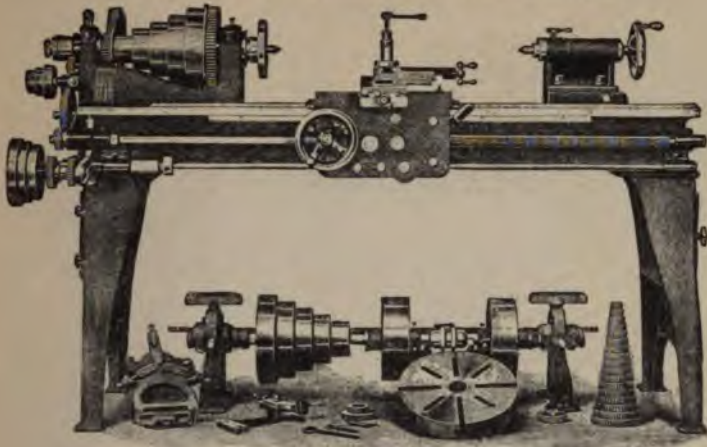


FIG. 11011

DESCRIPTION FIG. 11011

The head stock is very rigid. The metal is properly distributed to resist all strains that must be sustained by it. It has a five-step cone, large diameter, and with extra wide face.
 The spindle is of high carbon steel, ground to size. Bearings are of hard bronze, very large, with proper oiling facilities, and have means for adjustment when necessary.

End thrust of spindle is sustained by a step, firmly bolted to end of head stock, entirely independent of the spindle.
 The tail stock is the original of the offset type (patented), allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole, the tail stock is in keeping with the excellent general character of the machine.

The carriage, which is heavy, has a very stiff bridge, long bearings on Vs, and is securely gibbed to the bed. The compound or plain blocks are very wide and generously proportioned.
 The apron is bolted firmly to the carriage. All gears in apron are amply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage travels back and forth on bed.

Feed works. Three changes of belt feed can be had by means of the three-step cone. Three other changes are made by changing gears, making in all, nine changes of feed.
 The belt-tightener keeps the feed belt always taut.
 Positive geared feed is supplied with each lathe. To use the same it is only necessary to swing the belt-tightener up, so that the gear on the hub of feed cone meshes with gear which runs loose on splined bushing which is on lead screw; the number of feed changes to be had is limited only to the number of change gears with lathe.

The lead screw is large, of coarse pitch and accurate, and is rotated only when screw-cutting.
 Automatic stop for feed disengages clutch on feed rod.
 Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches, are supplied with each lathe.

When specified with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor. Gears for cutting any odd thread not included in regular equipment.

SPECIFICATIONS.

	14"	16"		14"	16"
Swings over ways.....	14 1/4"	16 1/4"	Distance between centers, 6' bed.....	35'	30 1/2'
Swings over compound rest.....	9"	11 1/4"	Change gears cut from.....	5 to 48	5 to 36
Swings over raise and fall rest.....	7 1/2"	9 1/4"	Width of cone belt.....	2"	2 1/4"
Diameter of front bearing.....	2 3/4"	2 1/2"	Largest diameter of cone.....	9 3/4"	10"
Length of front bearing.....	3 1/4"	4 1/4"	Diameter of counter pulley.....	10 1/2"	10 1/2"
Diameter of rear bearing.....	1 9/8"	1 9/8"	Face of counter pulleys.....	3 1/2"	3 1/4"
Length of rear bearing.....	2 9/8"	2 5/8"	Speed of countershaft, R. P. M.....	220	220
Diameter of spindle nose.....	2 1/4"	2 1/4"	Weight, 6' bed.....	1,400 lbs.	1,680 lbs.
Diameter of hole in spindle.....	1 3/4"	1 3/4"	Weight boxed, 6' bed.....	1,560 lbs.	1,975 lbs.

14" AND 16" SWING ENGINE LATHES.

WITH QUICK CHANGE GEAR.

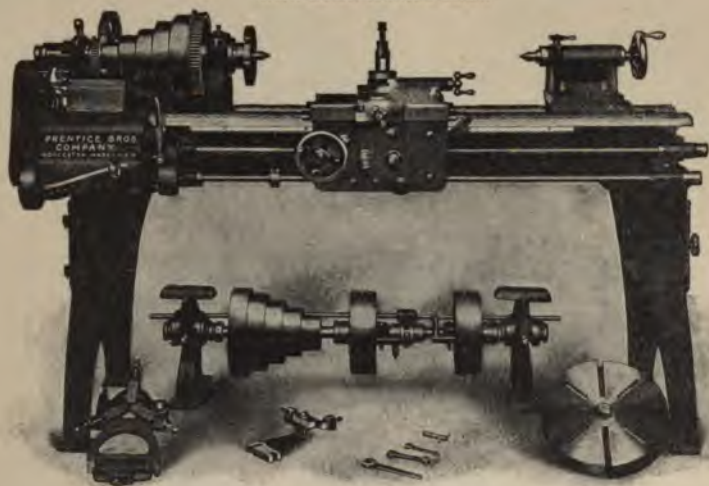


FIG. 11012.

DESCRIPTION FIG. 11012.

The quick-change gear mechanism permits of a change from one feed to another, or from one thread to another, almost instantly. An index plate on the head stock makes the screw-cutting changes so simple that even an inexperienced hand can operate without trouble or mistakes.

The head stock is very rigid. The metal is properly distributed to resist all strains that must be sustained by it. It has a five-step cone, large diameter, and with extra wide face.

The spindle is of high carbon steel, ground to size. Bearings are of hard bronze, very large, with proper oiling facilities, and have means for adjustment when necessary.

End thrust of spindle is sustained by a step, firmly bolted to end of head stock, entirely independent of the spindle.

The tail stock is the original of the offset type, allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole, the tail stock is in keeping with the excellent general character of the machine.

The carriage, which is heavy, has a very stiff bridge, long bearings on V's, and is securely gibbed to the bed. The compound or plain blocks are very wide and generously proportioned.

The apron is bolted firmly to the carriage. All gears in apron are simply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage travels back and forth on bed.

The lead screw is large, of coarse pitch and accurate, and is rotated only when screw-cutting.

Automatic stop for feed, disengages clutch on feed rod.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches, are supplied with each lathe.

When specified with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor. Gears for cutting any odd thread not included in regular equipment.

SPECIFICATIONS.

	14"	16"		14"	16"
Diameter of front bearing.....	2½"	2½"	Distance between centers, 6' bed.....	35"	30½"
Length of front bearing.....	3½"	4½"	Quick-change gear device cuts from.....	2 to 64	2 to 60
Diameter of rear bearing.....	1¾"	1¾"	Width of cone belt.....	2"	2¼"
Length of rear bearing.....	2¾"	2¾"	Largest diameter of cone.....	9¼"	10"
Diameter of spindle nose.....	2¼"	2¼"	Diameter of counter pulleys.....	10½"	10½"
Diameter of hole in spindle.....	1½"	1½"	Face of counter pulleys.....	3½"	3¼"
Swings over ways.....	14¼"	16¼"	Speed of countershaft, R. P. M.....	220	220
Swings over compound rest.....	9"	11¾"	Weight, 6' bed.....	1,400 lbs.	1,680 lbs.
Swings over raise and fall rest.....	7½"	9¼"	Weight boxed, 6' bed.....	1,590 lbs.	1,975 lbs.

14", 16" AND 18" IMPROVED ENGINE LATHES.

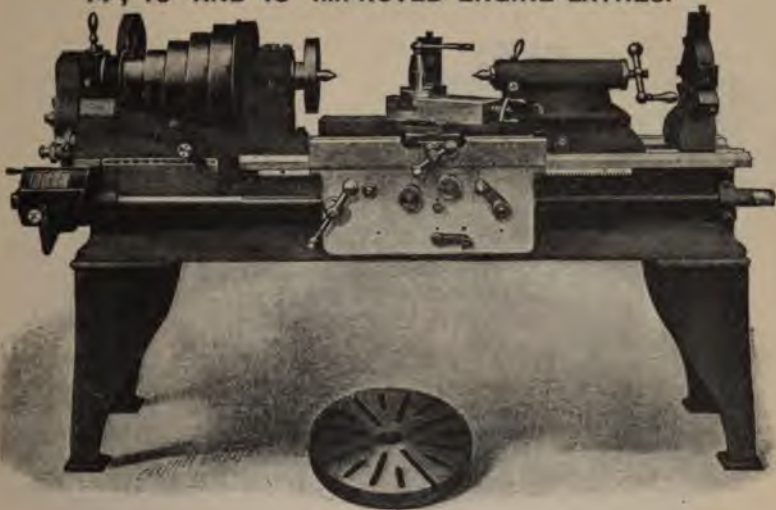


FIG. 11013.

DESCRIPTION FIG. 11013.

The head stock is neat but massive. The cone pulley has five steps, the faces of which are extra wide. It is turned inside, as well as outside to insure perfect balance. The ratio of back gearing is very high. The spindle is regularly made from .55 carbon steel and has a large hole through its entire length. The bearings are very massive. The journals are made absolutely round and straight by grinding. The boxes in which the journals revolve are provided with oil reservoirs, and at the center of each journal is a ring with four projecting buckets which dip the oil from the reservoirs and pour it onto the journals. Perfect lubrication is thus assured regardless of the speed.

All exposed gears are well protected by gear covers which add greatly to the appearance of the machine. The bed is designed with ample depth and width and is strongly braced internally by cross girts. The surfaces to which the lead screw bearings are fastened, are planed and grooved to receive them and are in perfect alignment. The V's are 45° and are large. At the rear end, the bed is cut out to facilitate the removal of tail stock or turret. The feed rack is of steel, accurately cut in one piece. The carriage is heavy, is provided with liberal T slots milled from the solid and is gibbed to the bed its entire length. The bearing on the bed is not recessed, but is in full contact from end to end with the entire depth of the V on the bed. Instead of an inside V at the front of the lathe, a flat is used. This shortens the bridge of the carriage and insures a solid bearing directly below the tool rest. The apron is of ample length, width and thickness, and is very rigid, being provided with three heavy braces through its entire depth and a longitudinal brace across the bottom. It is tongued and grooved into the carriage, as well as bolted to it. The lead gearing, with the exception of the frictions, is cut from drop forged steel, and the studs are of steel, hardened and ground.

The feed gearing is driven from a spiline in the lead screw. The key with which the spiline engages is very long and the edges of the spiline are carefully rounded so that there is no possibility of any cutting of the half nuts. The threads of the lead screw are never in use, except when the lathe is cutting screws.

Both the longitudinal and cross feeds are reversed at the apron, and are driven by independent frictions which effectually prevent disaster in case either is allowed to run beyond the limit.

The compound rest is substantially built and is extremely neat in appearance. Both the upper and lower slides are fitted with taper gibs, which, besides being tapering, are tongued and grooved into the slide, so that no amount of strain will displace them. These gibs are provided with two screws only, one at either end, which take up the wear evenly and are possible of delicate adjustment.

The quick change gear system has many points of excellence, chief among which is its extreme simplicity. The range of feeds for both thread cutting and feeding is very great, the number of changes on this lathe being fifty. Any thread or feed which the lathe will cut can be instantly obtained without removing or putting on a single gear, and while the machine is in motion. The fact that all feeds are gear driven insures a positive control of them not to be had with belt-fed lathes.

The tail stock is massive and has a long bearing on the bed. It is shaped so as to allow the compound rest to be set at 90° when turning the smallest diameters. Suitable screws are provided for setting it sideways, and the base has a 2° index graduated to sixteenths of an inch. An improved locking device has been incorporated which effectually prevents throwing the spindle out of line when locking.

The countershaft has a cone pulley of larger diameter than the one on the spindle in order to give ample belt power. The friction pulleys are of large diameter and very wide face. The friction clutches have been redesigned and are powerful and easily adjusted.

Regular equipment consists of large and small face plates, compound rest, steady and follower rests, countershaft and wrenches. Taper attachment and turrets on bed or carriage can be supplied at extra charge.

Swing over V's.....	14"	16"	18"	Hole through spindle.....	1 1/2"	1 3/4"	1 7/8"
Swing over compound rest.....	14 1/2"	16 1/2"	18 1/2"	Front bearing of spindle.....	2 1/2" x 3 1/4"	2 3/4" x 3 1/2"	3 1/4" x 3 3/4"
Swing over carriage.....	9"	10 1/2"	11 1/2"	Diameter of tail spindle.....	1 1/2"	1 3/4"	1 7/8"
8-foot lathes taken between centers.....	2 1/2"	2 3/4"	2 7/8"	Leads of spiline threads per inch.....	2 to 64	2 to 64	2 to 64
Weight of 0' lathes.....	1,275 lbs.	2,000 lbs.	2,700 lbs.	Speed of countershaft, R. P. M.....	125 to 185	125 to 185	125 to 185
Ratio of back gearing.....	9 to 1	10 to 1	12 1/2 to 1	Size of pulleys on countershaft.....	12" x 4 1/2"	12" x 4 1/2"	14" x 4 1/2"
Cone diameters.....	8 1/2" to 10 1/2"	10" to 13 1/4"	12" to 4"	Size of tool.....	8" x 1"	8" x 1 1/2"	8 1/2" x 1 1/2"
Width of steps on cone.....	2 1/2"	2 3/4"	2 7/8"				

14", 16" AND 18" ENGINE LATHES.

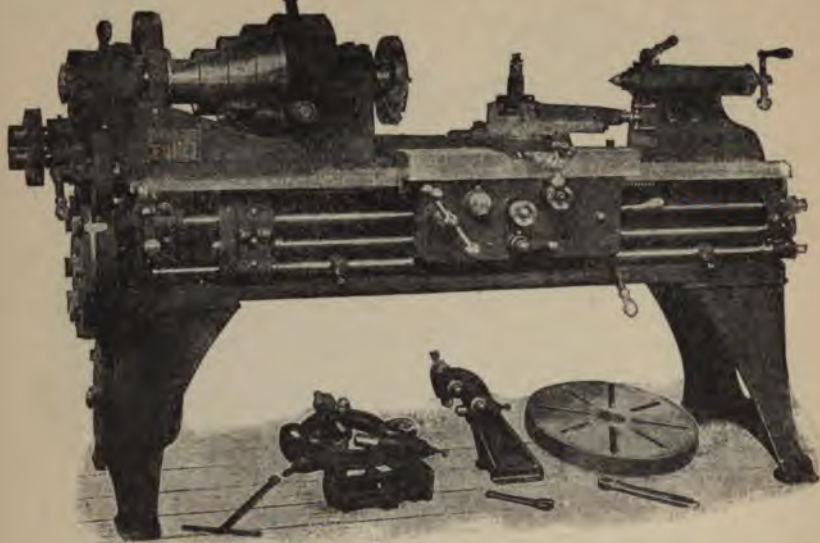


FIG. 11014.

DESCRIPTION FIG. 11014.

The ideal engine lathe presented herewith is arranged to meet the demands of modern shop practice by being equipped with such mechanism (patented) which will permit of effecting all changes necessary for a wide change of feeds and screw-cutting with despatch, and without removing any parts held by nuts and washers. The first consideration was to have only such gears running which are necessary to transmit motion from the spindle to the lead screw, and although the reverse gears have been added to the head stock, only seven gears transmit motion when a right-hand thread is being cut, and eight for a left-hand thread.

All the change gears which are required on the lead screw have hubs extending on one side and revolve freely in bearings placed concentric in a disc. This disc is large enough in diameter to serve the purpose of a gear guard, since none of the gears, of which there are eight, are visible. The disc revolves on a stud, secured to a case suspended from the front lead screw box. By revolving the disc any of the gears, all of which are independent of each other, can be brought in line with the lead screw.

The lead screw has a telescopically arranged extension controlled by a lever. This extension is reduced at its end to enter the hole in change gear, a distance equal to their width, before the clutches with which the change gears and extension are fitted come in contact with each other. Thus, when one of the change gears is connected with the lead screw, it ceases to depend on the disc for support, but is mounted on the lead screw as substantially as if secured to same by nut and washer.

Three pairs of gears suitably supported in cases, one of which is always in use, and the other two nicely contained in the cabinet leg, give five ratios of speed to the intermediate gear, which meshes with the gears on the lead screw, namely: Even, 2 to 1, 4 to 1; and when the latter two are reversed: 1 to 2 and 1 to 4 are obtained.

The intermediate gear, referred to before, revolves on a fixed stud in quadrant, as it requires no radial adjustment. The quadrant has a projection on its lower side, which is machined to the pitch radius of the intermediate gear, and as the same provision is made on the disc for each of its gears, it is only necessary to drop the intermediate gear until these surfaces meet and then secure same with clamp lever.

Forty pitches of screw threads and speeds are obtained, the changes for each being made while the lathe is in motion. The reversing mechanism is of a type which does not require the use of a reversible countershaft for screw-cutting purposes, and as it is controlled by the lever at the lower right-hand end of apron, it is very convenient and sensitive. The reversing rod also serves the purpose of an automatic stop in both directions, for either turning or screw-cutting.

The addition of a friction geared head spindle to a standard engine lathe is just as desirable as this device is indispensable to screw machines, turret lathes, etc., and, while it in a measure complicates the lathe and adds somewhat to its cost, its advantages are so great as to outweigh every other consideration many times. The frictions are carefully constructed, susceptible of ample and convenient adjustment for wear, and will give the services required of them during the life of the lathe.

The spindle is hollow, made of hammered crucible steel with journals of large diameter, revolving in self-oiling bronze boxes. The feed rod has been maintained to drive the friction feeds. All feeds in the apron are connected by friction; the friction feed and lead screw cannot be engaged at the same time.

The lathes are equipped with all modern accessories. A new and improved taper attachment is furnished, secured to the rear of the bed and arranged to be operated from the front of the lathe by the mere loosening of one nut and clamping another. It is of very rigid construction, has screw adjustment and is carefully graduated.

Nothing has been left undone to make this machine an ideal engine lathe, suitable for tool room and manufacturing purposes.

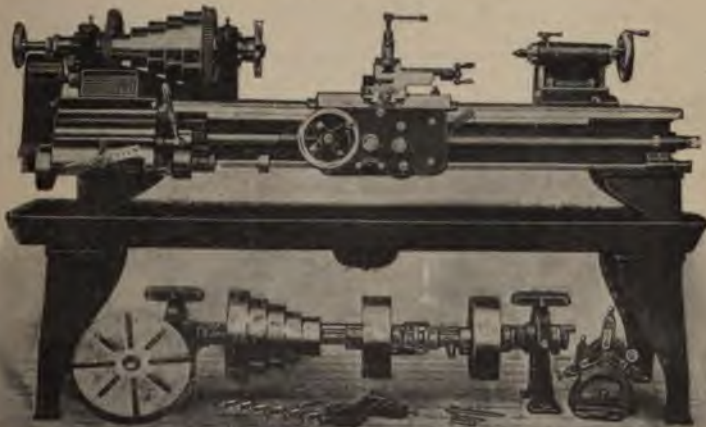
For specifications see next page.

14", 16" AND 18" ENGINE LATHES.

DESCRIPTION FIG. 11014.—Continued.

	14"	16"	18"
Front bearing of spindle.....	2½" x 4"	2¾" x 4½"	3¼" x 5¼"
Back bearing of spindle.....	2" x 3"	2¼" x 3½"	2½" x 4"
Hole through spindle.....	1½"	1½"	1½"
Core diameters, head stock.....	3½", 5½", 7½", 9½"	4", 6", 8", 10"	4½", 6½", 9¼", 11½"
Width of belt.....	2"	2½"	3½"
Ratio of back gearing.....	10	10	11
Diameter of tail stock spindle.....	1½"	1½"	2"
Cuts screws from.....	2 to 56 per in.	2 to 56 per in.	1 to 28 per in.
Feeds from.....	8 to 224 per in.	8 to 224 per in.	5 to 140 per in.
Actual swing over bed.....	15"	17"	19"
Actual swing over carriage.....	9½"	10½"	12"
Six-foot lathes takes between centers.....	2' 10"	2' 5"	2'
Speed of countershaft, revolutions per minute.....	150	120	120
Friction pulleys—countershaft.....	10" diam. for 3½" belt	10" diam. for 3½" belt	12" diam. for 4" belt
Net weight of lathes with 6' bed.....	1,650 lbs.	2,150 lbs.	2,700 lbs.
Shipping weight, crated, domestic.....	1,800 lbs.	2,300 lbs.	2,900 lbs.
Shipping weight, additional, per foot.....	100 lbs.	135 lbs.	175 lbs.
Weight, boxed for foreign shipment.....	2,000 lbs.	2,500 lbs.	3,100 lbs.
Dimensions, boxed.....	85" x 35" x 29"	87" x 36" x 32"	85" x 40" x 34"
Taper attachment furnished to order, turns taper up to 4° per foot.....	18" long	18" long	24" long

14" SWING TOOL ROOM LATHE.



DESCRIPTION FIG. 11015.

Although our regular lathe is extensively used for tool room purposes and fills these requirements as far as accuracy and capacity are concerned, we are now building 14" and 16" lathes especially adapted to tool-room work.

The cut illustrates our 14" tool room lathe equipped with improved quick-change gear device. Compound rest and taper attachment, oil pan and short legs. The spindle is hollow and is furnished with seven draw-in collets which will take in from ¼" to ½" by sixteenths.

For specifications and detailed description refer to Fig. 11012, page 10. The tool room lathe is an adaptation of the regular pattern lathes there shown.

When specified with order we supply, at extra cost, electric motor attachment of any style or make motor, gears for cutting any odd thread not included in regular equipment.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

14", 16", 18" AND 20" PATENT HEAD ENGINE LATHES.

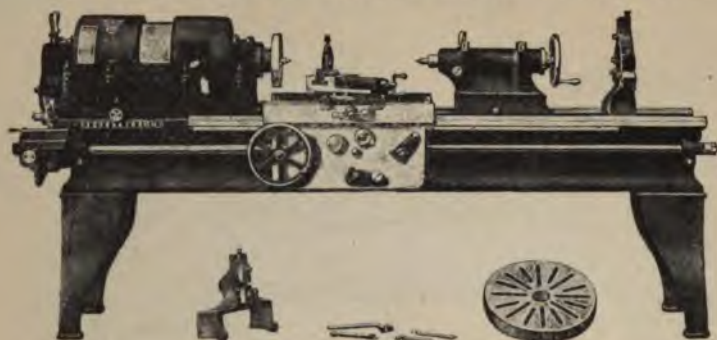


FIG. 11016.

DESCRIPTION FIG. 11016.

This lathe is the result of several years of experimenting with various devices for providing more power than is possible with the ordinary type of cone pulley and its necessarily narrow belt. When the lathe is so equipped it has all the advantages and functions of the regular type, but has sufficiently greater power and durability to enable it to successfully use the improved tool steels. In its design the aim has been to give particular consideration to the following features, which we believe to be of the highest importance in their effect upon the efficiency of the tool.

- First: The spindle bearings upon which the accuracy of the lathe depends should not be subjected to change of alignment by carrying the pull of the belt.
- Second: More force at the tool should be secured by the use of wider belts, instead of high gear ratios.
- Third: The possibility of running the lathe "out of gear" should be provided for in cases where finishing cuts are desired.
- Fourth: Speed changes should be secured without the necessity of shifting belts.
- Fifth: The lubrication of the bearings should be automatic and positive.

SPECIFICATIONS.

	14"	16"	18"	20"
Swings over shears.....	14½"	16½"	18½"	20½"
Swings over compound rest.....	9"	10½"	10½"	12½"
6' lathes taken between centers, tall stock-flush.....	4' 6"	4' 1"	3' 9"	3' 6"
Beds made in even lengths.....	6' to 14'	6' to 14'	6' to 20'	6' to 20'
Weight of 8' lathes.....	1,350 lbs.	2,300 lbs.	3,100 lbs.	3,500 lbs.
No. 1 back gear ratio.....	3.04: 1	3.12: 1	3.12: 1	3.12: 1
No. 2 back gear ratio.....	9.6: 1	9.3: 1	9.8: 1	9.8: 1
Pulley diameter.....	8"	10"	12"	12"
Width of belt.....	3½"	4"	4½"	5"
Hole through spindle.....	1¼"	1½"	1½"	1½"
Front bearing spindle.....	2½" x 4½"	2½" x 5½"	3¼" x 5½"	3½" x 6½"
Pulley bearings.....	2½" x 2½"	2½" x 3½"	3¼" x 4"	3½" x 4½"
Back bearing of spindle.....	1¾" x 2½"	2½" x 4"	2½" x 4"	2½" x 4½"
Diameter of tail-spindle.....	1½"	1½"	2"	2¼"
Speed of countershaft, both forward.....	205-250	205-250	205-250	205-250
Speed of countershaft, forward and reverse.....	250-300	250-300	250-300	250-300
Size of friction pulleys on countershaft.....	12" x 4½"	12" x 4½"	14" x 6"	14" x 6"
Lathe cuts threads, per inch, from.....	2 to 64	2 to 64	2 to 32	2 to 32
Feeds, per inch.....	16 to 512	4 to 128	5 to 80	5 to 80
Maximum and minimum spindle speeds.....	395-20	409-20	372-17	372-17
Steady rest takes in up to.....	3"	4½"	5"	6½"
Follower rest takes in up to.....	1¾"	2½"	2½"	2½"
Size of tool.....	½" x 1"	½" x 1½"	½" x 1½"	½" x 1½"
Angular travel of compound rest.....	2½"	3"	4¾"	4¾"

15", 16", 17", 18" AND 21" IMPROVED ENGINE LATHES.

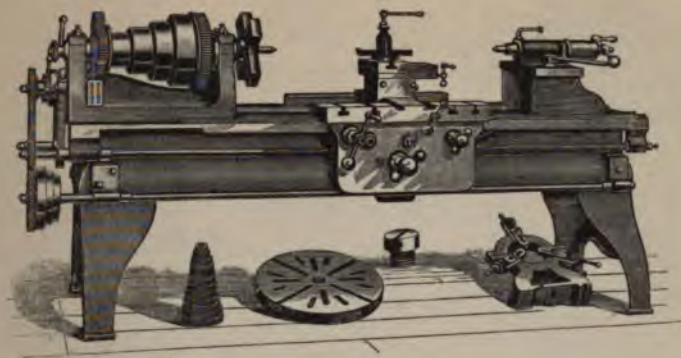


FIG. 11017

DESCRIPTION FIG. 11017.

Each lathe is provided with large and small face plates, steady rest, full set of change gears for screw cutting, countershaft, and all necessary wrenches.

Either plain block or compound rest can be furnished. Taper attachment can be supplied if wanted.

SPECIFICATIONS.

	15"	16"	17"	18"	21"
Swing over ways.....	15"	16"	17"	18"	21"
Length of bed.....	9'	8'	8'	8'	10'
Takes between centers.....	3' 4"	3'	2' 6"	4' 6"	6' 2"
Swings over carriage.....	8"	10½"	11¼"	12"	13"
Number of steps on cone.....	4	4	4	4	4
Size of cone belt.....	2"	2½"	2½"	2½"	3"
Hole in spindle.....	1½"	1¾"	1¾"	1¾"	1¾"
Diameter of front spindle bearing.....	2"	2½"	2½"	2½"	3"
Length of front spindle bearing.....	4"	4"	4"	4"	4½"
Countershaft pulleys.....	10" x 3"	12" x 3"	12" x 3"	12" x 3"	14" x 4"
Speed of countershaft, R. P. M.....	135	130	120	120	115
Weight.....	1,550 lbs.	1,700 lbs.	1,850 lbs.	2,000 lbs.	3,200 lbs.

16", 18", 20" AND 22" SWING HIGH SPEED LATHES.

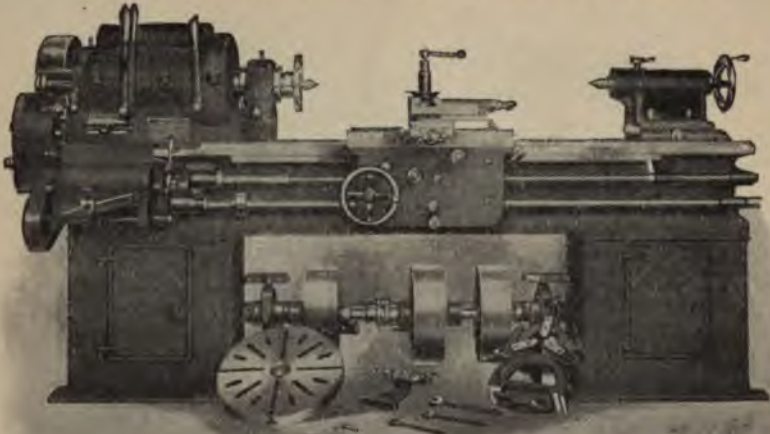


FIG. 11019.

DESCRIPTION FIGS. 11018 AND 11019.

The head stock is massive, with large spindle bearings, and is self-aligning throughout.

Driving pulley is located on back shaft and drives the spindle by means of gearing. There are eight changes of spindle speed, all of which may be obtained while the lathe is in motion.

Friction clutches of our special design are employed, enabling these changes of speed to be made without shock or danger to the gears. It is impossible to engage two conflicting ratios of gearing at the same time. The belt power is constant and will transmit at least fifteen horse-power. This is the correct principle, as it gives a maximum power at any speed of the spindle.

The quick-change gear mechanism permits of a change from one feed to another, or from one thread to another, instantly. An index plate on the head stock makes the screw-cutting changes so simple that even an inexperienced hand can operate without trouble or mistakes.

The end thrust of spindle is sustained by a step, firmly bolted to end of the head stock, entirely independent of the spindle bearings.

The tail stock is the original of the off-set type allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole this tail stock is in keeping with the excellent general character of the machine.

The carriage is very rigid, and the bridge is especially stiff, with long bearings on Vs, and is securely gibbed to the bed.

The apron is bolted rigidly to the carriage, and all gears are amply strong to carry their load. When screw-cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage traverses back and forth on bed.

The lead screw is large and coarse pitch and accurate, is rotated only when screw-cutting.

Automatic stop for feed disengages clutch on feed rod.

The compound or plain blocks are very wide and generously proportioned.

When specified with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor, gears for cutting any odd thread not included in regular equipment.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

For specifications see next page.

26" AND 32" SWING HIGH SPEED LATHES.

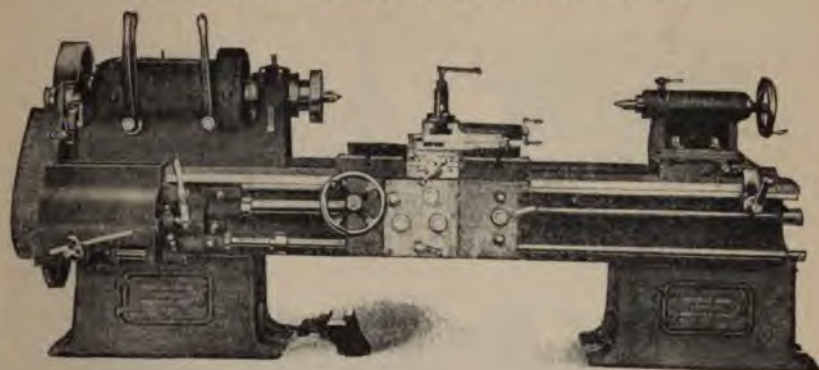


FIG. 11019.

SPECIFICATIONS FIGS. 11018 AND 11019.

	10"	18"	20"	22"	26"	32"
Diameter of front bearing.....	5½"	6"	6"	7"	7½"	8¼"
Length of front bearing.....	2¾"	2¾"	3"	3½"	4¾"	5½"
Diameter of rear bearing.....	3¾"	3¾"	3¾"	4¼"	5½"	6¾"
Length of rear bearing.....	2¾"	2¾"	2¾"	2¾"	3¾"	4"
Diameter of nose of spindle.....	2¾"	2¾"	2¾"	3"	4¼"	4½"
Hole in spindle, Morse taper.....	1¼"	1¼"	1¼"	1½"	2½"	2½"
Swings over ways.....	17½"	18"	20¼"	22½"	26½"	32¼"
Swings over compound rest.....	11½"	11¾"	13¾"	14"	16"	20"
Over raise and fall rest.....	9"	*	+	+	*	*
Length of bed.....	6'	8'	10'	10'	10'	12'
Distance between centers.....	24"	42"	59"	59"	51"	68"
Will cut threads per inch.....	2 to 60	2 to 32	2 to 32	2 to 16	1 to 16	½ to 24
Width of driving belt.....	3"	4"	4"	5"	5¾"	6"
Diameter of driving pulley.....	12"	14"	14"	16"	16"	18"
Diameter of counterfriction pulleys.....	12"	14"	14"	16"	16"	18"
Face of counter pulley.....	3"	4"	4"	5"	5¾"	6"
Speed of countershaft, revolutions per minute.....	350	350	350	360	300	300
Weight.....	2,650 lbs.	3,400 lbs.	4,200 lbs.	4,800 lbs.	6,800 lbs.	10,000 lbs.
Weight boxed.....	3,100 lbs.	4,010 lbs.	5,050 lbs.	5,700 lbs.	7,900 lbs.	11,200 lbs.
Cubic feet.....	65	140	180	190	210	250

For general description see preceding page.

* Only the 16" lathes can be built with raise and fall rest.

18", 20" AND 22" SWING ENGINE LATHES.

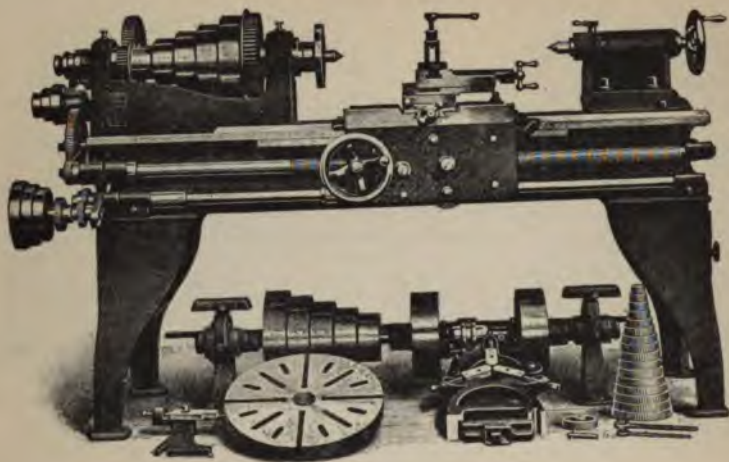


FIG. 11020.
(Shows Standard Pattern.)

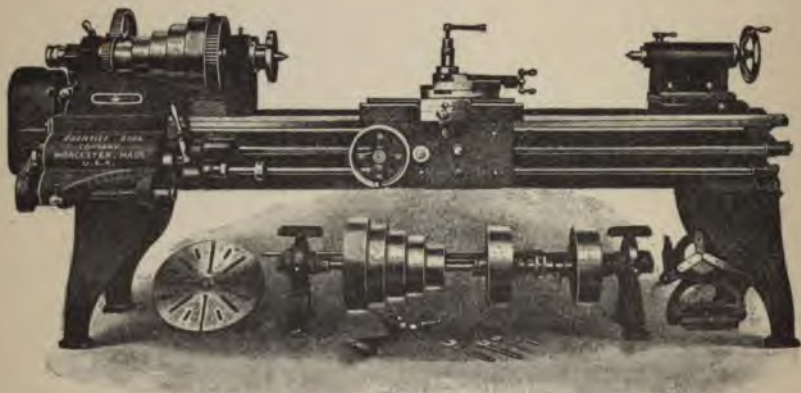


FIG. 11021.
(Shows Quick Change Gear Pattern.)

18", 20" AND 22" SWING ENGINE LATHES.

DESCRIPTION FIGS. 11020 AND 11021.

The head stock is very rigid. The metal is properly distributed to resist all strains that must be sustained by it. It has a five-step cone, large diameter, and with extra wide face.

The spindle is of high carbon steel, ground to size. Bearings are of hard bronze, very large, with proper oiling facilities, and have means for adjustment when necessary.

End thrust of spindle is sustained by a step, firmly bolted to end of head stock, entirely independent of the spindle.

The tail stock is the original of the offset type, allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole, the tail stock is in keeping with the excellent general character of the machine.

The carriage, which is heavy, has a very stiff bridge, long bearings on Va. and is securely gibbed to the bed. The compound or plain blocks are very wide and generously proportioned.

The apron is bolted firmly to the carriage. All gears in apron are amply strong to carry their load. When screw cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage travels back and forth on bed.

Feed works. On the standard pattern lathe three changes of belt feed can be had by means of the three-step cone. Three other changes are made by changing gears, making in all nine changes of feed.

The belt tightener keeps the feed belt always taut.

Positive geared feed is supplied with each lathe. To use the same it is only necessary to swing the belt tightener up, so that the gear on the hub of feed cone meshes with gear which runs loose on splined bushing which is on lead screw. The number of feed changes to be had is limited only to the number of change gears with lathe.

When furnished with quick change gear, the mechanism permits of a change from one feed to another or from one thread to another, almost instantly. A wide range for screw-cutting or feeding is obtainable and an index plate on the head stock makes all changes so simple that even an inexperienced hand can operate without trouble or mistakes. On the *Quick Change Gear* type of lathe there are no loose gears.

The lead screw is large, of coarse pitch and accurate, and is rotated only when screw cutting.

Automatic stop for feed disengages clutch on feed rod.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

When specified with order we supply, at extra cost, taper attachment and electric motor attachment of any style or make motor.

SPECIFICATIONS.

	18"	20"	22"
Swings over ways.....	18 $\frac{1}{4}$ "	20 $\frac{1}{4}$ "	22 $\frac{1}{2}$ "
Swings over compound rest.....	12 $\frac{3}{4}$ "	13 $\frac{3}{4}$ "	14"
Distance between centers, 8' bed.....	46 $\frac{1}{2}$ "	42"	37"
Diameter of front bearing.....	2 $\frac{3}{8}$ "	3"	3 $\frac{1}{4}$ "
Length of front bearing.....	6"	6 $\frac{1}{2}$ "	7"
Diameter of rear bearing.....	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	2 $\frac{3}{4}$ "
Length of rear bearing.....	3 $\frac{1}{4}$ "	4"	4 $\frac{1}{2}$ "
Diameter of spindle nose.....	2 $\frac{1}{4}$ "	2 $\frac{3}{4}$ "	3 $\frac{1}{4}$ "
Diameter of hole in spindle.....	1 $\frac{1}{4}$ "	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "
Change gears cut from.....	2 to 36	2 to 18	1 to 18
Quick change gear device cuts from.....	2 to 32	2 to 32	1 to 16
Width of cone belt.....	2 $\frac{1}{2}$ "	3 $\frac{1}{4}$ "	3 $\frac{1}{4}$ "
Largest diameter of cone.....	12 $\frac{3}{4}$ "	13 $\frac{1}{2}$ "	15"
Diameter of counter pulley.....	12"	14"	14"
Face of counter pulleys.....	3 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	4 $\frac{3}{4}$ "
Speed of countershaft, R. P. M.....	220	220	220
Weight, 8' bed.....	2,250 lbs.	2,920 lbs.	3,800 lbs.
Weight boxed, 8' bed.....	2,685 lbs.	3,340 lbs.	4,510 lbs.

Note: In ordering, always advise whether standard pattern or quick change pattern lathe is required.

17" AND 19" IMPROVED ENGINE LATHES.

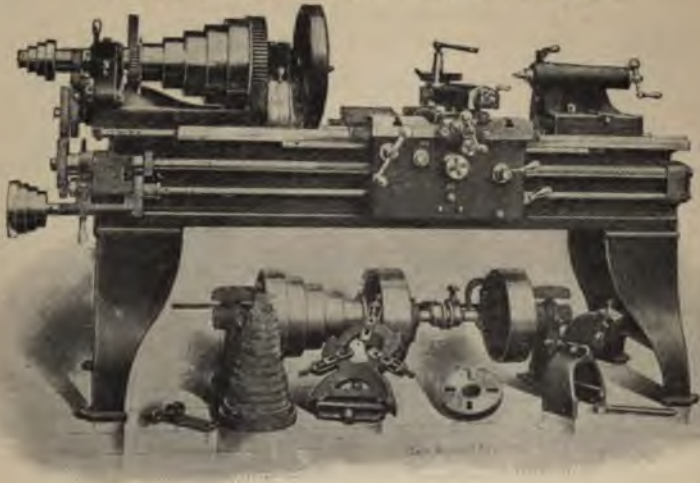


FIG. 11022.

DESCRIPTION FIG. 11022.

This lathe has been carefully designed, and is built from entirely new patterns, well proportioned, with all modern improvements, and equally well adapted to the handling of either light or heavy work in the most accurate and convenient manner.

The head stock is massive, webbed its entire length, and not weakened to make room for reverse plate.

The spindle is made of crucible steel with a hole through its entire length. The bearings for the spindle are of the best quality of composition metal, and are massive both front and back. The spindle is ground to insure its being absolutely round and true. The thrust collars are of steel, hardened and ground. The cone has five steps, and is strongly back-gears.

The tail stock is massive, and is reamed for No. 4 Morse taper.

All feeds are reversed in the apron, which is so arranged that it is impossible to throw in the rod and the screw feeds at the same time.

The carriage has bearing on each of the V's, having a bearing its entire length on the two outside V's, and is locked for cross-feed work by an eccentric clamp from the front, which performs the work without any twist or side strain, such as produced by a gib tightener.

The friction cross feed is graduated to one-thousandth of an inch, and is so constructed that if the cross feed is allowed to run beyond its limit no harm will be done. The compound rest is very substantial, and both upper and lower slides are fitted with taper gibs.

The geared feed being positive, all feeds are obtainable within the range of modern practice and without using the lead screw. There are also four changes of belt feed, and feeds can be driven with belt or gearing, without disconnecting either. Both the cross and length feeds can be operated at the same time.

This lathe is furnished with plain tool rest, steady and follow rest, large and small face plates, change gears, countershaft, and wrenches.

Compound rest, taper attachment, plain turret on carriage, plain or automatic turret on shear, also pan under 6' bed, furnished when desired. Beds of any desired length can be furnished.

SPECIFICATIONS.

	17"	19"
Length of bed (9' lathe).....	6' 5"	6' 6"
Swing over bed.....	17 1/4"	19 1/2"
Swing over carriage.....	9 1/4"	11 1/4"
Turn in length.....	34"	28"
Turn in length, with tail stock extended.....	38"	31"
Weight of lathe, with 6' bed.....	2,100 lbs.	2,540 lbs.
Weight of bed, per foot.....	115 lbs.	130 lbs.
Ratio of back gearing.....	12 to 1	12 to 1
Front bearing.....	2 3/8" x 4 1/4"	3 1/2" x 6"
Rear bearing.....	2 1/4" x 4 1/4"	2 3/8" x 4 3/4"
Hole in spindle.....	1 1/2"	1 3/8"
Compound rest travel.....	4"	4"
Size of lathe tools.....	1 1/2" x 1 1/8"	1 1/2" x 1 1/8"
Countershaft pulleys.....	12" x 3 1/2"	12" x 3 1/2"
Speed of countershaft, revolutions per minute.....	150 & 160	140

20", 22", 24", 27" AND 30" IMPROVED ENGINE LATHES.

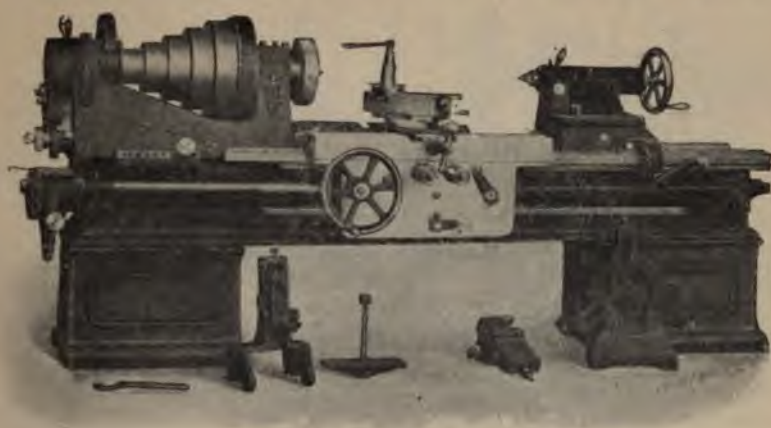


FIG. 11023.

DESCRIPTION FIG. 11023.

These are modern, up-to-date lathes, having quick change gear device for feeding and screw-cutting and many other valuable features. Regular equipment consists of large and small face plates, compound rest, steady and follow rests, countershaft and wrenches.

SPECIFICATIONS.

	20"	22"	24"	27"	30"
Swing over Vs	30 $\frac{1}{4}$ "	24 $\frac{1}{4}$ "	24 $\frac{1}{2}$ "	27 $\frac{1}{2}$ "	30 $\frac{1}{4}$ "
Swing over compound rest	12 $\frac{3}{4}$ "	16"	15"	17 $\frac{3}{4}$ "	20"
Swing over carriage	14"	16 $\frac{1}{2}$ "	16 $\frac{1}{2}$ "	19 $\frac{1}{2}$ "	21 $\frac{1}{2}$ "
12" laths taken between centers	8"	6' 9"	6' 2"	5' 11"	6' 2"
Weight of 12' lathe	4,200 lbs.	6,000 lbs.	7,000 lbs.	8,400 lbs.	10,000 lbs.
Ratio of back gearing	12.1 to 1	11.85 to 1	13.4 to 1	13 $\frac{1}{4}$ to 1	15 $\frac{1}{4}$ to 1
Cone diameters	12 $\frac{1}{2}$ " to 4 $\frac{1}{4}$ "	14 $\frac{1}{2}$ " to 5 $\frac{1}{4}$ "	15 $\frac{1}{2}$ " to 5"	17" to 6"	19 $\frac{1}{2}$ " to 6 $\frac{1}{2}$ "
Width of steps on cone	3 $\frac{1}{2}$ "	3 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	3 $\frac{1}{2}$ "	4 $\frac{1}{4}$ "
Hole through spindle	1 $\frac{3}{4}$ "	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	2 $\frac{3}{4}$ "	2 $\frac{3}{8}$ "
Front bearing of spindle	3 $\frac{1}{2}$ " x 5 $\frac{3}{4}$ "	4 $\frac{1}{2}$ " x 7 $\frac{3}{4}$ "	4 $\frac{1}{2}$ " x 8 $\frac{3}{4}$ "	4 $\frac{1}{2}$ " x 8 $\frac{3}{4}$ "	5 $\frac{1}{2}$ " x 9 $\frac{1}{4}$ "
Diameter of tail spindle	2 $\frac{1}{4}$ "	2 $\frac{3}{8}$ "	2 $\frac{1}{2}$ "	3 $\frac{1}{8}$ "	3 $\frac{1}{2}$ "
Lathe cuts threads per inch	2 to 32	1 to 16	1 to 16	1 to 16	1 to 14
Feeds per inch	5 to 80	5 to 80	5 to 80	5 to 80	5 to 70
Speed of countershaft, back geared lathe, R. P. M.	125 to 185	125 to 185	125 to 185	125	125
Speed of countershaft, triple geared lathe, R. P. M.			160 & 125	160 & 125	160 & 125
Size of pulley on countershaft	14" x 6"	16" x 7 $\frac{1}{2}$ "	16" x 7 $\frac{1}{2}$ "	16" x 7 $\frac{1}{2}$ "	18" x 9 $\frac{1}{2}$ "
Size of tool	$\frac{1}{2}$ " x 1 $\frac{1}{2}$ "	$\frac{1}{4}$ " x 1 $\frac{1}{2}$ "	$\frac{1}{4}$ " x 1 $\frac{1}{2}$ "	$\frac{3}{4}$ " x 1 $\frac{1}{2}$ "	$\frac{1}{2}$ " x 1 $\frac{1}{2}$ "

22" AND 24" ENGINE LATHES.

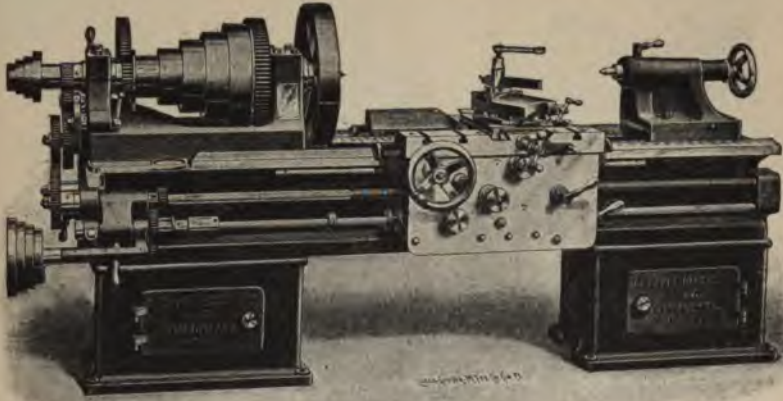


FIG. 11024.

DESCRIPTION FIG. 11024.

This lathe has been carefully designed, and is built from entirely new patterns, well proportioned, with all modern improvements, and equally well adapted to the handling of either heavy or light work in the most accurate and convenient manner.

The head stock is massive, webbed its entire length, and not weakened to make room for reverse plate.

The spindle is made of crucible steel with a $1\frac{1}{2}$ " hole through its entire length. The bearings for the spindle are of the best quality of composition metal, and are massive both front and back. The spindle is ground to insure its being absolutely round and straight. The thrust collars are of steel, hardened and ground. The cone has five steps for 3" belt, and is strongly back-geared.

The tail stock is massive, and is shaped that the compound rest may be set at an angle of 90°, permitting the tool to operate on the smallest diameters, and is reamed for No. 4 Morse taper.

All feeds are reversed in the apron, which is so arranged that it is impossible to throw in the rod and screw feeds at the same time.

The carriage has bearing on each of the V's, having a bearing its entire length on the two outside V's, and is locked for cross-feed work by an eccentric clamp from the front, which performs the work without any twist or side strain, such as produced by a gib tightener.

The automatic stop to the carriage is a valuable feature where large quantities of duplicate work are being done, as any number of pieces may be turned or bored up to a certain point without the necessity of laying off or marking each piece.

The friction cross feed is graduated to one-thousandth of an inch, and is so constructed that if the cross feed is allowed to run beyond its limit no harm will be done. The compound rest is very substantial, and both upper and lower slides are fitted with taper gibs.

The geared feed being positive, all feeds are obtainable within the range of modern practice and without using the lead screw. There are also four changes of belt feed, and feeds can be driven with belt or gearing, without disconnecting either. Both the cross and length feeds can be operated at the same time.

Threads, from 2 to 24 per inch (including $11\frac{1}{2}$), can be cut without changing gear on spindle, and a graduated dial on the carriage, connecting with the lead screw, enables the operator to catch the thread at any point without stopping the lathe or reversing the lead screw. By means of a drop plate in the apron the rack pinion can be disengaged or dropped when chasing threads, thereby releasing all the gears that would otherwise be running and adding to the friction of the carriage.

The countershaft has patent friction pulleys, 14" in diameter, for $4\frac{1}{2}$ " belt, and should run 130 revolutions per minute.

This lathe is furnished with compound rest, steady and follow rests, large and small face plates, change gears, countershaft and wrenches.

Plain rest, taper attachment, plain turret on carriage, plain or automatic turret on shear, furnished when desired. Beds of any desired length can be furnished.

SPECIFICATIONS.

Length of bed (8' lathe).....	22"	24"
Swing over bed.....	8' 6"	8' 6"
Swing over carriage.....	22 $\frac{1}{2}$ "	24 $\frac{1}{2}$ "
Turn in length.....	14"	16 $\frac{1}{2}$ "
Turn in length, with tail stock extended.....	4'	4'
Weight of lathe, with 8' bed.....	4' 8 $\frac{1}{2}$ "	4' 8 $\frac{1}{2}$ "
Weight of bed, per foot.....	4,500 lbs.	5,000 lbs.
Ratio of back gearing.....	180 lbs.	190 lbs.
Front bearing.....	13 to 1	13 to 1
Rear bearing.....	3 $\frac{3}{4}$ " x 7"	3 $\frac{3}{4}$ " x 7"
Hole in spindle.....	3 $\frac{1}{4}$ " x 4 $\frac{1}{2}$ "	3 $\frac{1}{4}$ " x 4 $\frac{1}{2}$ "
Compound rest travel.....	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "
Countershaft pulleys.....	7 $\frac{1}{4}$ "	7 $\frac{1}{4}$ "
Speed of countershaft, R. P. M.....	3 $\frac{1}{2}$ " x 11 $\frac{1}{2}$ "	3 $\frac{1}{2}$ " x 11 $\frac{1}{2}$ "
	14" x 4 $\frac{1}{2}$ "	14" x 4 $\frac{1}{2}$ "
	130	130

22", 24", 26", 30" AND 32" IMPROVED ENGINE LATHES.

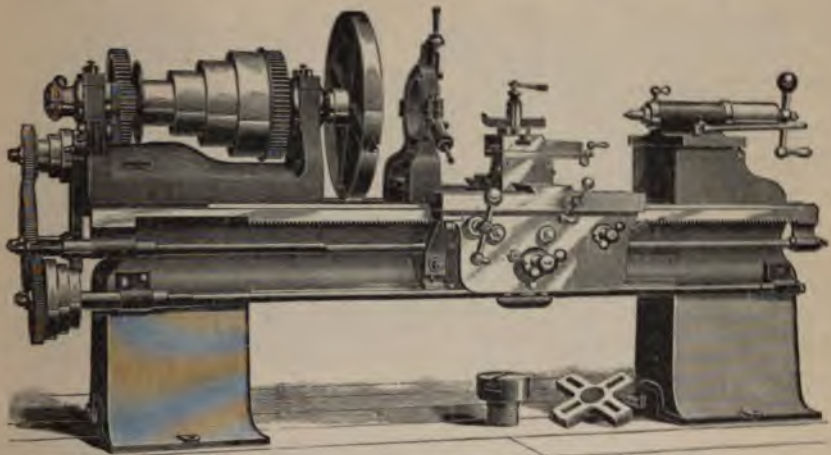


FIG. 11025.

DESCRIPTION FIG. 11025.

Each lathe is provided with large and small face plates, steady rest, full set of change gears for screw-cutting, countershaft and all necessary wrenches.

Either compound or plain block rest can be furnished. Taper attachment can be supplied if wanted.

SPECIFICATIONS.

	22"	24"	26"	30"	32"
Swings over ways	22"	24"	26"	30"	32"
Length of bed.....	10'	12'	12'	12'	12'
Takes between centers.....	0' 2"	8' 4½"	7' 4"	7' 3"	7'
Swings over carriage.....	14"	16½"	16½"	21"	23½"
Number of steps on cone.....	4	4	4	4	4
Size of cone belt.....	3"	3"	3½"	4"	4"
Hole in spindle.....	1½"	1½"	2½"	1½"	1½"
Diameter of front spindle bearing.....	3"	3"	3½"	4½"	4½"
Length of front spindle bearing.....	4½"	4½"	4½"	6"	6"
Countershaft pulleys.....	14" x 4"	16" x 4"	15" x 4"	15" x 5"	18" x 6"
Speed of countershaft, R. P. M.....	115	115	110	100	100
Weight.....	1,300 lbs.	4,200 lbs.	4,500 lbs.	6,100 lbs.	6,900 lbs.

22" 24" AND 27" PATENT HEAD ENGINE LATHES.

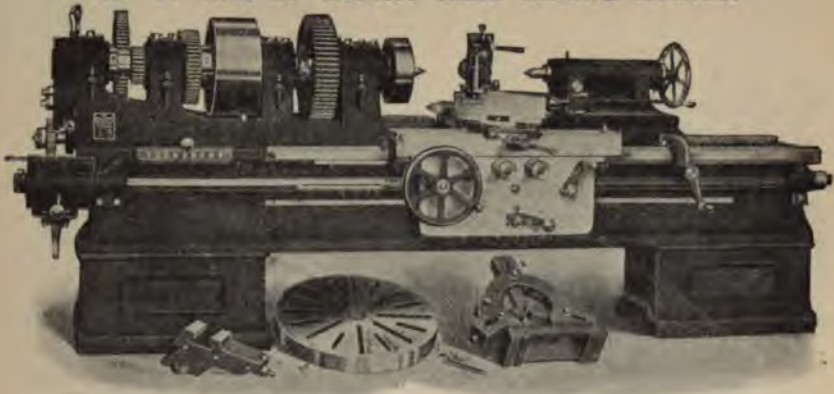


FIG. 11026.

DESCRIPTION FIG. 11026.

This lathe is the result of several years of experimenting with various devices for providing more power than is possible with the ordinary type of cone pulley and its necessarily narrow belt. When the lathe is so equipped it has all the advantages and functions of the regular type, but has sufficiently greater power and durability to enable it to successfully use the improved tool steels.

In its design the aim has been to give particular consideration to the following features, which we believe to be of the highest importance in their effect upon the efficiency of the tool:

First.—The spindle bearings, upon which the accuracy of the lathe depends, should not be subjected to change of alignment by carrying the pull of the belt.

Second.—More force at the tool should be secured by the use of wider belts, instead of high gear ratios.

Third.—The possibility of running the lathe "out of gear" should be provided for in cases where finishing cuts are desired.

Fourth.—Speed changes should be secured without the necessity of shifting belts.

Fifth.—The lubrication of the bearings should be automatic and positive.

Note.—Illustration shows the head stock with gear guards removed.

SPECIFICATIONS.

	22"	24"	27"
Swings over shears.....	24½"	24½"	27½"
Swings over compound rest.....	10"	15"	17½"
12" lathe takes between centers, tail stock flush.....	6' 2"	5' 6"	5' 1"
Beds made in even lengths.....	8' up	8' up	10' up
Weight of 12" lathe.....	6,000 lbs.	7,100 lbs.	8,400 lbs.
No. 1 back gear ratio.....	3.46:1	3.69:1	3.75:1
No. 2 back gear ratio.....	11.1:1	13:1	13.8:1
Pulley diameter.....	14½"	15½"	17"
Width of belt.....	6"	6½"	7"
Hole through spindle.....	2½"	2½"	2½"
Front bearing of spindle.....	4½" x 7¼"	4½" x 8½"	4½" x 8½"
Pulley bearings.....	4½" x 5"	4½" x 5¼"	4½" x 5¼"
Back bearing of spindle.....	3" x 5"	3½" x 5¼"	3½" x 5¼"
Diameter of tail spindle.....	2½"	2½"	3½"
Speed of countershaft, both forward, R. P. M.....	205-250	205-250	205-250
Speed of countershaft, forward and reverse, R. P. M.....	250-300	250-300	250-300
Size of friction pulleys on countershaft.....	16" x 7½"	16" x 7½"	16" x 7½"
Lathe cuts threads, per inch, from.....	1 to 16	1 to 16	1 to 16
Feeds, per inch.....	5 to 80	5 to 80	5 to 80
Maximum and minimum spindle speeds, R. P. M.....	368-14	414-13	305-12
Steady rest takes in up to.....	6¼"	7½"	8½"
Follower rest takes in up to.....	2½"	2½"	2½"
Size of tool.....	¾" x 1¼"	¾" x 1¼"	¾" x 1½"
Angular travel of compound rest.....	5°	5°	6½°

24" STANDARD ENGINE LATHE.

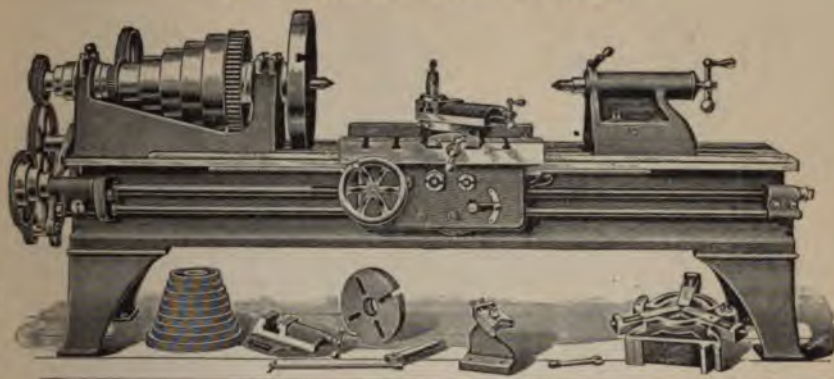


FIG. 11027.

DESCRIPTION FIG. 11027.

This machine has been carefully designed to meet modern requirements, and combines such features necessary to make it a very convenient, as well as rigid tool, capable of operating on both light and heavy work to the best possible advantage.

The head stock is neat in appearance, and so massive as to entirely obviate any tendency to chatter or vibrate under heaviest cuts. The spindle, which is journaled in hard bronze boxes, is made from a forging of hard crucible steel in one piece with the collar which forms a suitable surface for the face plate to screw against.

The diameter of nose is $3\frac{1}{2}$ " by $2\frac{1}{4}$ " long, threaded two-thirds of its length, four threads per inch, U. S. standard. This form secures some important advantages, namely: The face plates have a straight bearing on nose equal to one-third of its length, which insures better wearing qualities and facilitates placing them in position, and as the pitch of thread is coarse, a tendency to wedge tight enough to become difficult to remove is avoided.

The carriage is 32" in length with full bearings on V's and is gibbed to outside of bed. The compound rest is so arranged that its handle may be revolved without interfering with cross-feed handle in any position, and are fitted with long and wide bearings on carriage, with adjustable taper gibs to compensate for wear.

The base, which is graduated in degrees, securely holds by means of one bolt the top when swiveled to any angle. The feeds are driven directly from the spindle either with change gearing or belt, and are reversed in the apron, where provision is made so that friction feed and lead screw cannot be engaged at the same time to cause breakage.

Belt feeds are proportioned to give 65, 30, or 20 cuts to the inch, which will answer the usual requirements. The handle shown in front of lead screw box at head end of lathe must simply be turned to the right or left to respectively engage the gear or belt feed, or vice versa, without the necessity of disengaging the change gearing or removing the belts. A very desirable combination is secured by this device, its construction making it possible to give the belt any required tension necessary to perform its duty without slipping, and as the belt may be made endless, the annoyance from breakage and relacing are entirely avoided.

The tail stock is clamped in its position by two bolts located as near the front as possible to prevent lifting, and is of the recess or cutaway type.

A $2\frac{1}{2}$ " spindle is substantially fitted with 9" of movement, tightened in the usual manner when used in turning. Screws, racks and small gears are made of steel. Flat surfaces are carefully scraped to bearing, with surface plates and cylindrical surfaces ground true.

A new and improved taper attachment is furnished if desired, with which tapers up to 4" to the foot may be accurately turned.

Each lathe is furnished with large and small face plates, steady rest, follow rest, full swing rest and change gears necessary to cut nearly all threads from 1 to 16 per inch, inclusive of $1\frac{1}{2}$ " for pipe thread, countershaft and wrenches complete.

Any desired length of bed can be furnished.

PRINCIPAL DIMENSIONS.

Front bearing 4" diameter by 7" long.	Movement, 9".
Back bearing, $3\frac{1}{4}$ " diameter by $4\frac{1}{2}$ " long.	Cuts screws from 1 to 16 per inch, including $1\frac{1}{2}$ " for pipe thread.
Diameter of hole through spindle, $2\frac{1}{8}$ ".	Feeds per inch, 4 to 65.
Cone diameter (five steps), 6", $8\frac{1}{2}$ ", 11", $13\frac{1}{2}$ ", 16".	Size of friction pulleys on countershaft, 16" x $5\frac{1}{2}$ " for 5" belt.
Width of belt, $3\frac{1}{2}$ ".	Countershaft should run 60 revolutions per minute.
Ratio of back gearing, 12 to 1.	Swing over bed, $24\frac{1}{2}$ "; over carriage, 16".
Diameter of tail stock spindle, $2\frac{1}{4}$ ".	Length between centers on 10' bed, 5'.

SHIPPING WEIGHTS, ETC.

Net weight of 10' bed, 5,000 lbs.	Shipping weight (boxed, foreign), 6,000 lbs.
Dimensions for foreign shipment: 11' 2" x 3' 6" x 3' 6" - 136 cubic feet.	

26" SWING ENGINE LATHE.

DOUBLE BACK GEARED.



FIG. 11028.

DESCRIPTION FIG. 11028.

The head stock is very rigid. The metal is properly distributed to resist all strains that must be sustained by it. It has a four-step cone, large diameter, and with extra wide face.

The spindle is of high carbon steel, ground to size. Bearings are of hard bronze, very large, with self-oiling facilities, and have means for adjustment when necessary.

End thrust of spindle is sustained by a step, firmly bolted to end of head stock, entirely independent of the spindle.

The tail stock is the original of the offset type, allowing the compound blocks to be set in a plane parallel with the bed. Provision is made so that the tail stock can be set off center for turning taper. As a whole, the tail stock is in keeping with the excellent general character of the machine.

The carriage, which is heavy, has a very stiff bridge, long bearings on V_8 , and is securely gibbed to the bed. The compound or plain blocks are very wide and generously proportioned.

The apron is bolted firmly to the carriage. All gears in apron are amply strong to carry their load. When screw cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears and hand wheel while carriage travels back and forth on bed.

Feed works. Three changes of belt feed can be had by means of the three-step cone. Three other changes are made by changing gears, making in all, nine changes of feed.

The belt tightener keeps the feed belt always taut.

Positive geared feed is supplied with each lathe. To use the same it is only necessary to swing the belt tightener up, so that the gear on the hub of feed cone meshes with gear which runs loose on splined lashing which is on lead screw; the number of feed changes to be had is limited only to the number of change gears with lathe.

The lead screw is large, of coarse pitch and accurate, and is rotated only when screw cutting.

Automatic stop for feed, disengages clutch on feed rod.

When specified with order we supply, at extra cost, taper attachment, and electric motor attachment of any style or make motor. Gears for cutting any odd thread not included in regular equipment.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

SPECIFICATIONS.

Diameter of front bearing, $4\frac{1}{2}$ ".

Length of front bearing, $7\frac{1}{2}$ ".

Diameter of rear bearing, $3\frac{3}{4}$ ".

Length of rear bearing, $5\frac{1}{2}$ ".

Diameter of spindle nose, $4\frac{1}{4}$ " x $3\frac{1}{2}$ threads per inch.

Diameter of hole in spindle, $2\frac{1}{2}$ ", conforms to Morse taper.

Swings over ways, $26\frac{1}{2}$ ".

Swings over compound rest, 16".

Distance between centers, 12' bed, 70".

Change gears cut from $\frac{1}{8}$ " to 16 threads.

Width of cone belt, $3\frac{1}{2}$ ".

Largest diameter of cone, 17".

Diameter of counter pulley, 16".

Face of counter pulleys, 5".

Speed of countershaft, 220.

Weight, 12' bed, 6,800 lbs.

Weight boxed, 12' bed, 7,900 lbs.

Note: This lathe can be furnished with quick change gear device for feeding and screw cutting, if so desired.

26" DOUBLE BACK GEARED ENGINE LATHE.

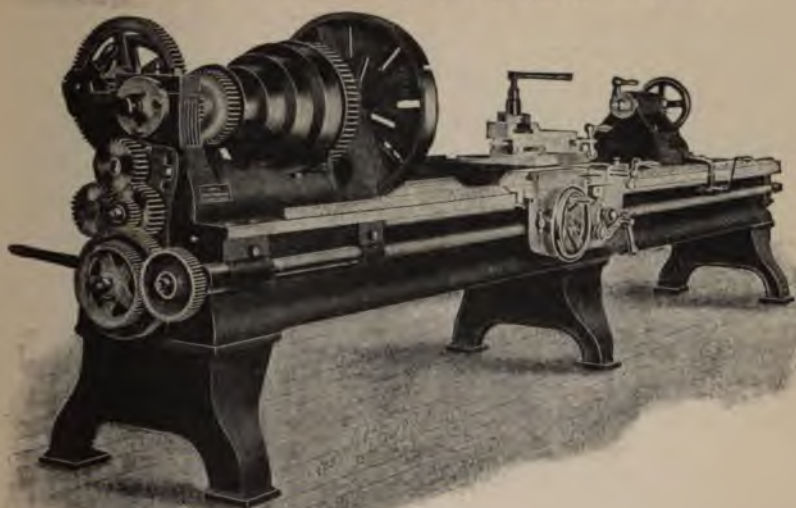


FIG. 11029.

DESCRIPTION FIG. 11029.

The swing over the ways is 27" and over the carriage 19".

The distance between centers with 16" bed is 11'.

The spindle is tool steel, ground to size, and the main bearing is 4" diameter by 7" long. End thrust is taken up by an adjustable step. The spindle runs in boxes of hard composition, 85 per cent copper to 15 per cent tin, scraped to fit spindle.

The face plate is 26" diameter and is screwed to the end of spindle. The proportions of back gearing give fifteen revolutions of cone to one of spindle.

The cone has four steps, largest 16½" diameter, and the back gears are double, so there are twelve changes of speed. There are two loose pulleys on the countershaft; by putting the corresponding pulleys on the line shaft, there are twenty-four changes of speed.

The centers are tool steel, 1½" diameter.

The bed is 23" wide and 14" deep. Cross ties box pattern, 28" between centers.

The tail stock is 16" long by 15" wide and is arranged to set over for taper turning. The tail spindle is steel, 2¾" diameter.

The carriage has a bearing on the ways 31" long, fitted to V's the whole length. It can be clamped when cross feeding.

There is a thread indicator on the screw, so that any thread, odd, even or fractional, can be cut without the slow back motion on the screw for catching the thread.

The feeds are independent friction, lateral and cross. The direction of feeds is changed at the carriage. The screw cutting attachment and feeds are connected to the spindle by gears. The change gears are so arranged that three leads or three feeds can be had for each change of gear on the screw.

Carriage gearing is driven by a spline in the lead screw. The screw is made of special high carbon steel, so as to be hard enough to resist wear in the parts most frequently used. It is 1½" diameter, two threads per inch.

All gearing in the apron is enclosed.

All gears running loose on shafts have brass bushings.

All the pinions and small feed gears are steel.

The rack is steel.

The countershaft pulleys and hangers are self-oiling.

The taper attachment turns taper to 30°. It is very readily engaged or disengaged, and is very rigid.

The attachments are compound rest, 6" center rest, 11" center rest, large and small face plates, change gears for 1 to 16 threads to the inch, thread indicator, self-oiling countershaft and wrenches.

Weight of 26" x 16' lathe is 8,800 lbs.

30" AND 36" STANDARD PATENT HEAD ENGINE LATHES.

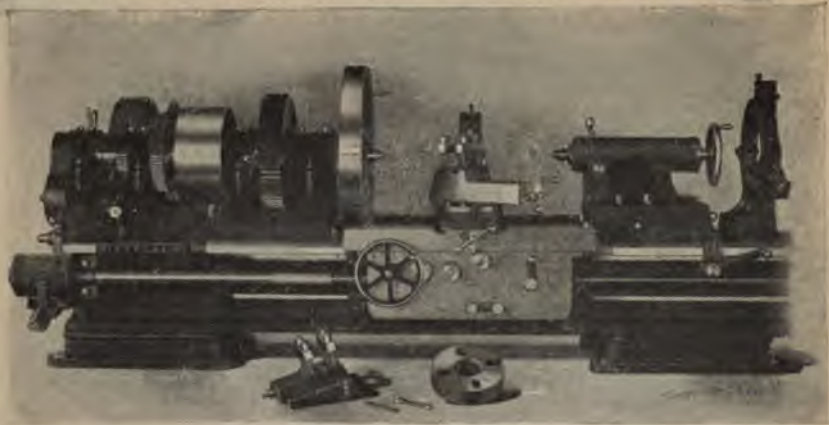


FIG. 11030.

DESCRIPTION FIG. 11030.

This lathe is the result of several years of experimenting with various devices for providing more power than is possible with the ordinary type of cone pulley and its necessarily narrow belt. When the lathe is so equipped it has all the advantage and functions of the regular type, but has sufficiently greater power and durability to enable it to successfully use the improved tool steels.

In its design the aim has been to give particular consideration to the following features, which we believe to be of the highest importance in their effect upon the efficiency of the tool:

First.—The spindle bearings upon which the accuracy of the lathe depends, should not be subjected to change of alignment by carrying the pull of the belt.

Second.—More force at the tool should be secured by the use of wider belts, instead of high gear ratios.

Third.—The possibility of running the lathe "out of gear" should be provided for in cases where finishing cuts are desired.

Fourth.—Speed changes should be secured without the necessity of shifting belts.

Fifth.—The lubrication of the bearings should be automatic and positive.

SPECIFICATIONS.

	30"	36"
Swings over shears	30 $\frac{1}{2}$ "	37"
Swings over compound rest	20"	24 $\frac{1}{2}$ "
12' lathe takes between centers, tail stock flush	5' 2"	4' 5"
Beds made in even lengths	12' up	12' up
Weight of 12' lathe	10,000 lbs.	12,500 lbs.
No. 1 back gear ratio	3.9: 1	3.98: 1
No. 2 back gear ratio	14.4: 1	14.9: 1
No. 1 triple gear ratio	22.4: 1	.....
No. 2 triple gear ratio	62.3: 1	.....
Pulley diameter	18"	20"
Width of belt	8"	9"
Hole through spindle	2 $\frac{1}{2}$ "	2 $\frac{5}{8}$ "
Front bearing of spindle	5 $\frac{1}{2}$ " x 9 $\frac{1}{4}$ "	6" x 10"
Pulley bearings	3 $\frac{1}{2}$ " x 5 $\frac{1}{4}$ "	6" x 5 $\frac{1}{4}$ "
Back bearing of spindle	4 $\frac{1}{2}$ " x 5 $\frac{1}{4}$ "	4 $\frac{3}{4}$ " x 5 $\frac{1}{4}$ "
Diameter of tail spindle	3 $\frac{1}{2}$ "	4 $\frac{1}{8}$ "
Speed of countershaft, both forward, R. P. M.	200-250	200-250
Speed of countershaft, forward and reverse, R. P. M.	250-300	250-300
Size of friction pulleys on countershaft	18" x 9 $\frac{1}{2}$ "	18" x 9 $\frac{1}{2}$ "
Lathe cuts threads, per inch, from	1 to 14	1 $\frac{1}{2}$ to 14
Feeds, per inch	5 to 70	2 $\frac{1}{2}$ to 70
Maximum and minimum spindle speeds, R. P. M.	300-8	270-7
Steady rest takes in up to	10 $\frac{1}{2}$ "	15 $\frac{1}{2}$ "
Lower rest takes in up to	3 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "
Size of tool	3 $\frac{1}{8}$ " x 1 $\frac{1}{2}$ "	1" x 2"
Angular travel of compound rest	4 $\frac{1}{2}$ "	15"

32" SWING ENGINE LATHE. WITH QUICK CHANGE GEAR.

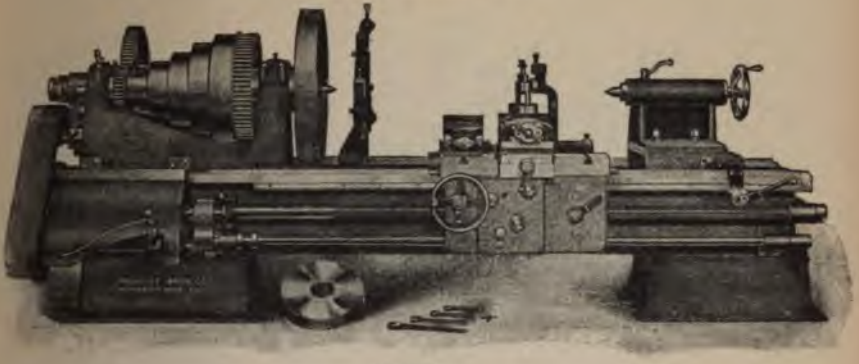


FIG. 11031.

DESCRIPTION FIG. 11031.

This lathe is of new design throughout and is especially adapted to meet the requirements of modern shop practice. It is of most substantial construction and can be relied upon to withstand the strain occasioned by the use of the special "high-speed tool steel" up to the full capacity of the steel.

The quick change gear mechanism permits of a change from one feed to another, or from one thread to another, almost instantly. There are forty-eight changes possible in screw cutting, ranging from $\frac{1}{4}$ thread to 24 threads per inch, and feed cuts from 2 to 96 per inch. An index plate on the head stock makes the screw cutting changes so simple that even an inexperienced hand can operate without trouble or mistakes.

The head stock is massive and metal is so distributed as to successfully resist all strains that must be sustained by it. It has a five-step cone, large diameter and with extra wide face. The bearings of hard bronze are very large, with proper oiling facilities, and have means for adjustment when necessary.

The end thrust of spindle is sustained by a step screw, firmly bolted to end of the head stock, entirely independent of the spindle bearings.

The tail stock is the original of the offset type, patented by Prentiss Brothers Co., allowing the compound blocks to be set in a plane parallel with the bed; it has a large spindle, and as a whole is in keeping with the excellent general character of the machine. Provision is made so that the tail stock can be set off center for turning taper.

The carriage is very rigid, and the bridge is especially stiff, with long bearings on V_8 , and is securely gibbed to the bed. It also has binder on rear end to clamp it to bed.

The apron is bolted rigidly to the carriage, and all gears are simply strong enough to carry their load. Both cross and lateral feeds are reversed from the apron. This is a great time-saving feature, especially in lathes with long beds. There is no danger of breaking gears in apron, as it is impossible to engage the lateral or cross feed when the open-and-shut feed is locked with the screw. When screw cutting, the rack pinion can be withdrawn from the rack, preventing rotation of gears.

The lead screw is rotated only when screw cutting.

The automatic stop for feed disengages clutch on feed rod.

The compound or plain blocks are very wide and generously proportioned.

When specified with order we supply, at extra cost, taper attachment, electric motor attachment of any style or make; gears for cutting any odd thread not included in regular equipment.

Face plates, large and small, center and follower rest, countershaft with two friction pulleys, and wrenches are supplied with each lathe.

SPECIFICATIONS.

Diameter of front bearing, $5\frac{1}{2}$ ".

Length of front bearing, $8\frac{3}{4}$ ".

Diameter of rear bearing, 4".

Length of rear bearing, $6\frac{3}{4}$ ".

Diameter of nose of spindle, $3\frac{1}{2}$ pitch, $4\frac{1}{2}$ ".

Hole in spindle, Morse taper, $2\frac{1}{4}$ ".

Swings over ways, $32\frac{1}{4}$ ".

Swings over compound rest, 20".

Swings over plain rest, 20".

Distance between centers, 12' bed, 8'.

Will cut 48 pitches from $\frac{1}{4}$ to 24 threads.

Feeds per revolution of spindle, $\frac{1}{4}$ " to $\frac{1}{8}$ ".

Width of cone belt, 4".

Largest diameter of cone, 21".

Diameter of counter pulley, 18".

Face of counter pulleys, $6\frac{1}{4}$ ".

Speed of countershaft, 200 revolutions per minute.

Weight, 12' bed, 8,845 lbs.; 14' bed, 9,455 lbs.

Weight of countershaft, 885 lbs.

Weight boxed, 12' bed, 10,145 lbs.

Cubic feet, 585.

36" TRIPLE GEARED ENGINE LATHE.

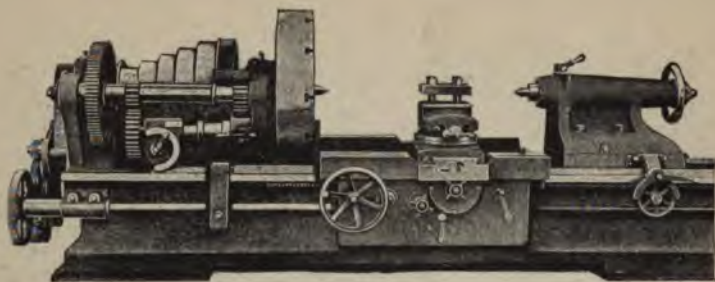


FIG. 11032.

DESCRIPTION FIG. 11032.

These lathes have been designed to meet all the requirements exacted of modern machine tools, and are equipped with every convenience necessary to perform the functions of an engine lathe, without being burdened with useless contrivances.

Although of extraordinary weight, ease of manipulation is maintained in the highest degree, and provision for all changes of feeds and speeds, etc., most conveniently arranged.

The head stocks are made, either with plain back gears, or triple gears, which engage directly with large internal gear, cut out of the solid in the face plates.

Means are provided for locking the back gears, when both in and out of gear, hence no delay can be occasioned by their being thrown out of contact when transmitting power for heavy cuts, or accidentally engaged while the lathe is running (a fruitful cause of broken gears).

The spindles are made of forgings of selected steel, with journals of large diameter, ground cylindrically true, and revolve in bronze boxes of great length. They are usually made solid, but can be made hollow, so as to receive a 3" round bar in the rough.

Cones have five steps for wide belts, which, together with the back gears, or triple gears, afford 10 and 15 speeds, respectively, arranged in geometrical progression.

Three sets of ratios are furnished for feeds and screw cutting, by a pair of cone gears, suitably supported at the rear end of head stock, in an apron, and manipulated by the handle shown on the front side.

This permits of throwing the feeds in, or out, while the lathe is running, thus affording an ample range for all purposes.

The carriage is very long, has a wide surface for cross slide, and is gibbed to the outside of the bed.

Power feeds are furnished for top slide of compound rests, as well as for cross and longitudinal motion.

All feeds are engaged by means of friction, and reverse motion is controlled at the apron.

The tail stock is clamped to the bed with four large bolts, and has a suitably geared pinion engaging with rack to allow of its being placed in any position on the bed, with ease.

It is fitted with a very long spindle, of large diameter, which allows of considerable movement, and gives maximum stability.

The lead screw is made of special steel, and cut from a master screw of great precision. A spline is used for driving the feeds, the threads being used only for screw cutting.

Provision for lubrication is made throughout. All parts subject to abrasion are hardened, planed surfaces scraped to surface plates, and cylindrical surfaces ground.

All gears are cut from the solid, pinions and rack being made of steel.

The lathes are made of the best material, in a finely equipped shop, where only the most modern methods of production prevail.

Each lathe is furnished with face plates, full swing, follow and steady rests, change gears, wrenches and countershafts, complete.

A taper attachment can be furnished, if desired. Same is of an improved type arranged so that it may be connected or disconnected instantly by simply loosening one bolt and tightening another, or vice versa.

A taper of four inches per foot, or less, may be turned, the adjustment being made by a screw.

SPECIFICATIONS.

Front bearings of spindles, 6" diameter by 10" long.

Rear bearing, 4½" diameter by 7" long.

Solid spindles (but can make hole through same, on order,

3½").

Cone diameter, for 36" triple geared, five steps, 22", 19", 16", 13",

and 10".

Width of belt for 36" triple gears, 4".

Ratio of triple gears, 52 to 1.

Diameter of tail stock spindle, 4".

Movement of same, 16".

Cut nearly all threads from ¼ to 16 per inch.

Tight and loose pulleys on countershaft 28" diameter, 10" face

for 5" belt.

Countershaft for triple geared lathe should run 120 revolutions

per minute.

36" lathe swings over bed, 37"; over carriage, 24".

Distance between centers on 12" bed, 4".

SHIPPING WEIGHTS, ETC.

36" x 12", triple gearing, 16,000 lbs.

Extra weight, per foot of bed, 450 lbs.

36" AND 40" IMPROVED ENGINE LATHES.

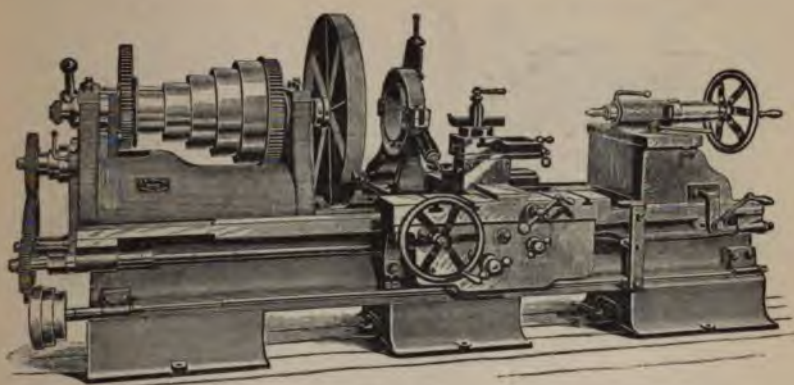


FIG. 11033.

DESCRIPTION FIG. 11033.

Each lathe is provided with large and small face plates, steady rest, full set of change gears for screw cutting, countershaft, and all necessary wrenches.

Either compound or plain black rest can be furnished. Taper attachment can be supplied if wanted.

SPECIFICATIONS.

	36"	40"
Swing over ways.....	30"	40"
Length of bed.....	12'	12'
Takes between centers.....	6' 2"	6' 2"
Swing over carriage.....	24"	26"
Number of steps on cone.....	5	5
Size of cone belt.....	4"	4"
Hole in spindle.....	1 1/4"	1 1/4"
Diameter of front spindle bearing.....	5"	5"
Length of front spindle bearing.....	7"	7"
Countershaft pulleys.....	22" x 5"	22" x 5"
Speed of countershaft, R. P. M.....	90	90
Weight.....	9,200 lbs.	9,400 lbs.

36" IMPROVED ENGINE LATHE.

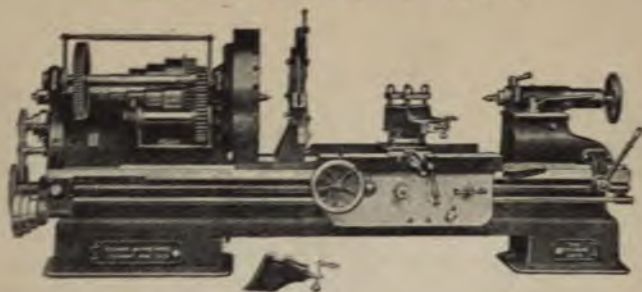


FIG. 11034.

DESCRIPTION FIGS. 11034 AND 11035.

These lathes are heavy and powerful, and will be found especially satisfactory for heavy work on which both rapidity of production and accuracy are desired. Material and workmanship in their construction is of the very best.

Head stocks are triple ground. Tail stocks are provided with means for quick adjustment, forward or back. Each lathe is regularly provided with steady rest, side block, screw cutting gear, friction counter-shaft and all necessary wrenches. Taper attachment can be furnished extra.

42" AND 50" IMPROVED ENGINE LATHES.

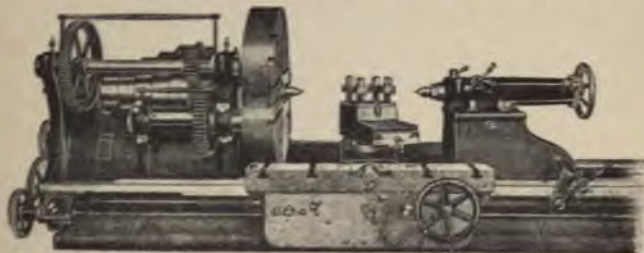


FIG. 11035.

SPECIFICATIONS, FIGS. 11034 AND 11035.

	36"	42"	50"
Swing over ways.....	36 $\frac{1}{2}$ "	42 $\frac{1}{2}$ "	50 $\frac{1}{2}$ "
Swing over carriage.....	25 $\frac{1}{8}$ "	30 $\frac{1}{8}$ "	34 $\frac{3}{8}$ "
Length of bed.....	12'	14'	20'
Distance between centers.....	5' 6"	6' 11"	12'
Dia. of spindle.....	1 $\frac{1}{2}$ "	1 $\frac{7}{8}$ "	1 $\frac{3}{8}$ "
Counter-shaft pulleys.....	24" x 5 $\frac{1}{2}$ "	24" x 5 $\frac{1}{2}$ "	24" x 6"
Speed of counter-shaft, revolutions per minute.....	82	103	90
Weight.....	12,000 lbs.	14,000 lbs.	21,000 lbs.

* These sizes are standard. Larger sizes can be furnished if desired.

36", 42" AND 48" IMPROVED ENGINE LATHES.

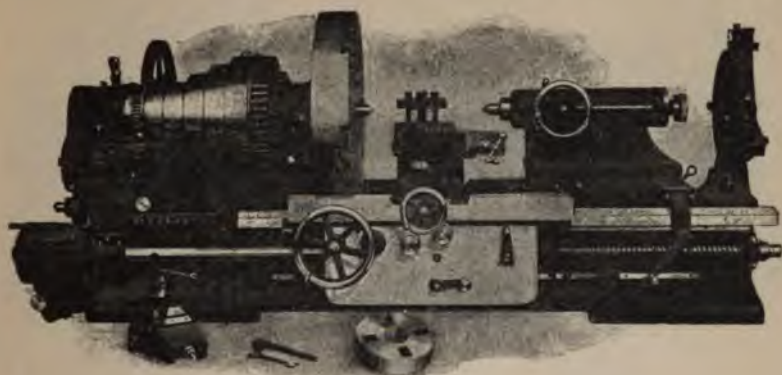


FIG. 11036.

DESCRIPTION FIG. 11036.

These lathes have quick change gear for screw cutting and feeding and can be furnished with either back geared head, as shown, or triple geared, if desired.

Regular equipment consists of large and small face plates, compound rest, steady and full swing rests, countershaft and wrenches.

SPECIFICATIONS.

	36"	42"	48"
Swing over Vs.....	37"	43 $\frac{3}{4}$ "	50"
Swing over compound rest.....	24 $\frac{1}{4}$ "	30 $\frac{1}{2}$ "	35 $\frac{1}{2}$ "
Swing over carriage.....	20 $\frac{1}{2}$ "	23 $\frac{1}{4}$ "	38 $\frac{1}{2}$ "
12' lathe takes between centers.....	5' 2"	4' 1"	3' 5"
Weight of 12' lathe.....	12,500 lbs.	21,000 lbs.	25,000 lbs.
Ratio of back gearing.....	11.1 to 1	8.34 to 1	8.34 to 1
Ratio of triple gearing.....	50.2 to 1	57.4 to 1	57.4 to 1
Cone diameters.....	19 $\frac{1}{8}$ " to 7 $\frac{3}{8}$ "	27 $\frac{1}{8}$ " to 13 $\frac{1}{4}$ "	24" to 9 $\frac{1}{2}$ "
Width of steps on cone.....	4 $\frac{1}{2}$ "	4 $\frac{1}{4}$ "	4 $\frac{1}{2}$ "
Hole through spindle.....	2 $\frac{1}{2}$ "	3 $\frac{1}{4}$ "	3 $\frac{1}{2}$ "
Front bearing of spindle.....	6" x 10"	6 $\frac{1}{2}$ " x 11"	7" x 12"
Diameter of tail spindle.....	4 $\frac{1}{4}$ "	5"	5"
Lathe cuts threads.....	$\frac{1}{2}$ to 14	$\frac{1}{2}$ to 14	$\frac{1}{2}$ to 14
Feeds per inch.....	3 $\frac{1}{2}$ to 70	3 to 84	3 to 84
Speed of countershaft, back geared lathe, R. P. M.....	80	80	80
Speed of countershaft, triple geared lathe, R. P. M.....		110	110
Size of tool.....		1" x 2"	1" x 2"

36" "MASSIVE," 42", 42" "MASSIVE" AND 48" PATENT HEAD LATHES.



FIG. 11037.

DESCRIPTION FIG. 11037.

This lathe is the result of several years of experimenting with various devices for providing more power than is possible with the ordinary type of cone pulley and its necessarily narrow belt. When the lathe is so equipped it has all the advantages and functions of the regular type, but has sufficiently greater power and durability to enable it to successfully use the improved tool steels.

In its design, the aim has been to give particular consideration to the following features, which we believe to be of the highest importance in their effect upon the efficiency of the tool:

First.—The spindle bearings upon which the accuracy of the lathe depends, should not be subjected to change of alignment by carrying the pull of the belt.

Second.—More force at the tool should be secured by the use of wide belts, instead of high gear ratios.

Third.—The possibility of running the lathe "out of gear" should be provided for in cases where finishing cuts are desired.

Fourth.—Speed changes should be secured without the necessity of shifting belts.

Fifth.—The lubrication of the bearings should be automatic and positive.

SPECIFICATIONS.

	36" Massive	42"	42" Massive	48"
Swings over shears.....	37"	43½"	.....	50"
Swings over compound rest.....	22½"	30½"	.....	35½"
14" triple geared lathe takes between centers.....	4' 3"	4' 3"	3' 10½"	3' 10½"
Beds made in even lengths.....	12" up	12" up	12" up	12" up
Weight of 14" lathe.....	21,500 lbs.	22,000 lbs.	23,000 lbs.	25,000 lbs.
No. 1 back gear ratio.....	2.94: 1	2.94: 1	2.94: 1	2.94: 1
No. 2 back gear ratio.....	8.29: 1	8.29: 1	8.29: 1	8.29: 1
No. 1 triple gear ratio.....	21.97: 1	21.97: 1	21.07: 1	21.97: 1
No. 2 triple gear ratio.....	61.92: 1	61.92: 1	61.92: 1	61.92: 1
Pulley diameter.....	24"	24"	24"	24"
Width of belt.....	9½"	9½"	9½"	9½"
Hole through spindle.....	2½"	2½"	2½"	2½"
Front bearing of spindle.....	6¼" x 11"	6¼" x 11"	6¼" x 11"	6¼" x 11"
Pulley bearings.....	6¼" x 7"	6¼" x 7"	6¼" x 7"	6¼" x 7"
Back bearing of spindle.....	5¼" x 8¼"	5¼" x 8¼"	5¼" x 8¼"	5¼" x 8¼"
Diameter of tail spindle.....	5"	5"	5"	5"
Speed of countershaft, both forward, R. P. M.....	200-250	200-250	200-250	200-250
Speed of countershaft, forward and reverse, R. P. M.....	250-300	250-300	250-300	250-300
Size of friction pulleys, on countershaft.....	24" x 9½"	24" x 9½"	24" x 9½"	24" x 9½"
Lathe v-threads, per inch, from.....	½ to 14	½ to 14	½ to 14	½ to 14
Feeds, per inch.....	3 to 84	3 to 84	3 to 84	3 to 84
Maximum and minimum spindle speeds, R. P. M.....	250-2	250-2	250-2	250-2
Steady rest takes in up to.....	13½"	13½"	17½"	17½"
Size of tool.....	1" x 2"	1" x 2"	1" x 2"	1" x 2"
Power feed angular travel of compound rest.....	19°	19°	19°	19°

38" TRIPLE GEARED ENGINE LATHE.



FIG. 1103B.

DESCRIPTION FIG. 1103B.

The swing over the ways is $39\frac{1}{2}$ ".

The distance between centers with 16' bed is 8' 6" It can be built with any length of bed desired.

The bed is $32\frac{1}{2}$ " wide and $17\frac{1}{2}$ " deep. Heavy cross ties are of box pattern, 30" between centers.

The spindle is of crucible steel, ground to size, and runs in heavy bronze boxes scraped to fit the spindle. The main bearing is $6\frac{1}{2}$ " diameter and $10\frac{1}{2}$ " long. The outer bearing is $5\frac{1}{4}$ " in diameter by 7" long. End thrust is taken up by an adjustable step.

The face plate is 39" diameter and $7\frac{1}{2}$ " wide, with 3 pitch internal gearing, and is pressed and keyed on to the spindle.

The proportions of triple gearing give 52 revolutions of cone to one of spindle.

The cone has five steps for 4' belt, the largest $22\frac{1}{2}$ " in diameter and the smallest $10\frac{1}{4}$ ", so there are 15 changes of speed. There are two loose pulleys on the countershaft; by putting the corresponding pulleys on the line shaft there are 30 changes of speed.

The tail stock is $25\frac{1}{4}$ " long by 23" wide, and is arranged to set over for taper turning. The tail spindle is steel, $4\frac{3}{8}$ " diameter. Tail stock is moved by rack and pinion.

The carriage has a bearing on the ways of $42\frac{1}{4}$ ", scraped and fitted to V_8 the whole length. It can be clamped when cross feeding.

Carriage gearing is driven by a spline in the lead screw.

The lead screw is $2\frac{1}{8}$ " diameter, two threads per inch, and is made of special high carbon steel, so as to be hard enough to resist wear in the parts most frequently used.

The feeds are independent friction, lateral and cross.

The directions of feed are changed at the apron. The screw cutting attachment and feeds are connected to the spindle by gears.

Change gears cut threads from 1 to 16 to the inch. They are so arranged that three leads or three feeds can be had for each change of gear on the screw.

There is a thread indicator on the carriage so that any thread, odd, even or fractional, can be cut without the slow back motion on the screw for catching the thread.

The countershaft pulleys, 24" diameter with 10" face, are bronze lined, and with the hangers, are self-oiling.

The centers are tool steel 2" in diameter.

All gears running loose on shafts have bronze bushings.

All pinions and small feed gears are steel.

The rack is steel.

The attachments are large face plate, compound rest, side turning or full swing rest, center rest, thread indicator, change gears, self-oiling countershaft and wrenches.

Weight of 38" lathe with 16' bed, 16,500 lbs

42" ENGINE LATHE.



FIG. 11039.

DESCRIPTION FIG. 11039.

These lathes have been designed to meet all the requirements exacted of modern machine tools, and are equipped with every convenience necessary to perform the functions of an engine lathe, without being burdened with useless contrivances.

Although of extraordinary weight, ease of manipulation is maintained in the highest degree, and provision for all changes of feeds and speeds, etc., most conveniently arranged.

The head stocks are made, either with plain back gears or triple gears, which engage directly with large internal gear, cut out of the solid in the face plates.

Means are provided for locking the back gears, when both in and out of gear, hence no delay can be occasioned by their being thrown out of contact when transmitting power for heavy cuts, or accidentally engaged while the lathe is running (a fruitful cause of broken gears).

The spindles are made of selected steel, with journals of large diameter, ground cylindrically true, and revolve in bronze boxes of great length. They are usually made solid, but can be made hollow, so as to receive a 3" round bar in the rough.

Cones have five steps for wide belts, which, together with the back gears, or triple gears, afford 10 and 15 speeds, respectively, arranged in geometrical progression.

Three sets of ratios are furnished for feeds and screw cutting, by a pair of cone gears, suitably supported at the rear end of head stock, in an apron, and manipulated by the handle shown on the front side.

This permits of throwing the feeds in, or out, while the lathe is running, thus affording an ample range for all purposes.

The carriage is very long, has a wide surface for cross slide, and is gibbed to the outside of the bed.

Power feeds are furnished for top slide of compound rests, as well as for cross and longitudinal motion.

All feeds are engaged by means of frictions, and reverse motion is controlled at the apron.

The tail stock is clamped to the bed with four large bolts, and has a suitably geared pinion engaging with rack to allow of its being placed in any position on the bed, with ease.

It is fitted with a very long spindle, of large diameter, which allows of considerable movement, and gives maximum stability.

The lead screw is made of special steel, and cut from a master screw of great precision. A spline is used for driving the feeds, the threads being used only for screw cutting.

Provision for lubrication is made throughout. All parts subject to abrasion are hardened, planed surfaces scraped to surface plates, and cylindrical surfaces ground.

All gears are cut from the solid, pinions and rack being made of steel.

The lathes are made of the best material, in a finely equipped shop, where only the most modern methods of production prevail.

Each lathe is furnished with face plates, full swing, follow and steady rests, change gears, wrenches and countershafts, complete.

A taper attachment can be furnished, if desired. Same is of an improved type arranged so that it may be connected or disconnected instantly by simply loosening one bolt and tightening another, or vice versa.

A taper of 4" per foot, or less, may be turned, the adjustment being made by a screw.

DIMENSIONS OF THE 42" LATHE.

Front bearings of spindles, 6" diameter by 10" long.

Rear bearing, 4 3/4" diameter by 7" long.

Solid spindles (but can make hole through same, on order, 3 1/2").

Cone diameter, five steps, 42" lathes, with plain back gears; 24", 20 1/4", 16 1/4", 12 3/4", and 9".

Cone diameter, for 42" triple geared, five steps, 22", 19", 16", 13" and 10".

Width of belt for 42" lathe, plain back gears, 4 1/2".

Width of belt for 42" triple geared, 4".

Ratio of back gears, 12 to 1.

Ratio of triple gears, 52 to 1.

Diameter of tail stock spindle, 4".

Movement of same, 16".

Cut nearly all threads from 1/4 to 16 per inch.

Tight and loose pulleys on countershaft 28" diameter, 10" face for 6" belt.

Countershaft for back geared lathe should run 60 revolutions per minute.

Countershaft for triple geared lathe should run 120 revolutions per minute.

42" lathe swings over bed, 42"; over carriage, 28".

Distance between centers on 12" bed, 4".

SHIPPING WEIGHTS, ETC.

42" x 12", back gears, 16,000 lbs.

42" x 12", triple gearing, 17,000 lbs.

Extra weight, per foot of bed, 450 lbs.

MOTOR DRIVEN, GEARED HEAD, HIGH SPEED LATHES.
EQUIPPED WITH CONSTANT SPEED MOTORS.

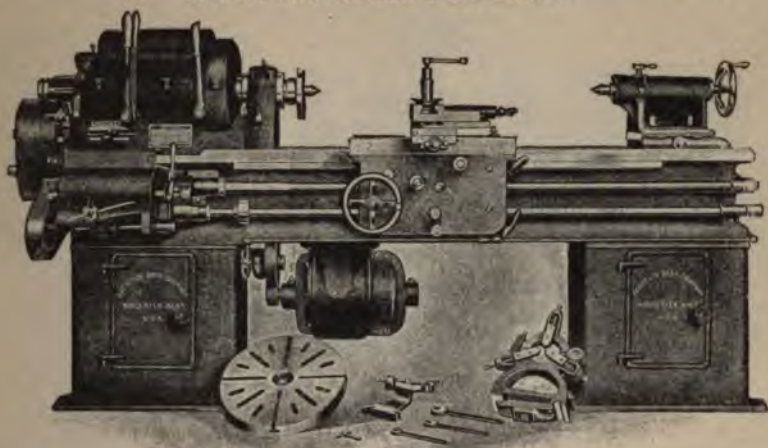


FIG. 11040.

DESCRIPTION FIG. 11040.

This cut illustrates our method of attaching an electrical motor to our geared head, high speed lathes, especially the 14", 16", 18", 20" and 22" sizes. On the 26" and 32" lathes it is necessary to mount the motor on the rear side of the head stock (not on the end), as the motor is usually of a size that would prohibit locating it under the lathe bed.

There are eight changes of spindle speed provided by means of gearing, located in the head stock of the lathe. All of these speeds are obtainable without stopping the lathe. The gearing is so arranged as to make it impossible for the operator to interlock any conflicting rates of gearing. This is an advantage that is greatly appreciated, as it removes all possible danger of breakage to the gearing or the clutches in the driving mechanism of this machine.

A mechanical reverse is provided and operated from the carriage of the lathe so that the operator can start, stop and reverse the direction of the spindle without stopping the motor. This is a great saving of power over the method commonly used, i. e., reversing motor, stopping and starting motor when stopping, starting and reversing lathes.

In cutting threads it is much easier to turn to a shoulder with our method, as the motion of the reverse lever necessary to reverse the lathe is only two or three inches and works very easily compared with the crank necessary to operate a reversible controller.

For operating these lathes we recommend a constant speed motor with either direct or alternating current, although a direct current motor, with a variation allowing an increase of 50 per cent in the speed, can be used to some advantage and would divide the steps of our mechanical speed variation into five or six additional changes, giving 40 or 48 changes of speed in all. In general practice, however, this great number of speeds is not needed. The advantages of using a constant speed motor are numerous outside of the matter of efficiency, as in most cases variable speed motors are of a special nature and it is much more difficult to secure repair parts than it is with the constant speed motor, as one can usually have the parts shipped immediately from stock. Also the wear upon the variable speed reversing controller is considerable when you take into consideration the number of times that the lathe is stopped, started and reversed each day. And best of all is the induction motor which is without commutator troubles, which is the main cause for trouble with all direct current motors. We mention this fact because our lathes are especially adapted to the use of induction motors or any constant speed motor.

On receipt of specifications stating requirements, we are pleased to submit estimates on complete equipment, including motor and all electrical accessories, or, if desired, customers may furnish their own motors, shipping to our factory, where we will apply them to the lathes.

THE AUTOMATIC THREADING LATHE.

16" X 6' BELT-DRIVE LATHE.

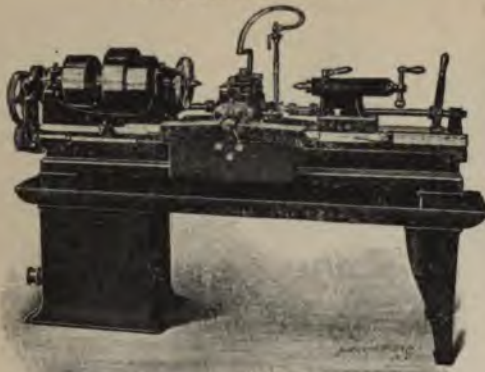


FIG. 11041.

The engine lathe is one of the oldest of machine tools; it has developed from many years and might be said to be fully developed, yet we daily see the need of cutting steels, application of electric driving, etc., etc., and the end is not yet! So far as its use for cutting screws and worm threads is concerned, the torsional limit of the stock operated upon is far within the endurance limit of the tools, so the matter is narrowed to the best form of tools, the highest practicable attainment of cutting speeds consistent with their effect upon accuracy—due to the generation of heat—and lastly, the extent to which the human element may be eliminated in attendance; and here is just where the methods employed on, and automation of, the automatic threading lathe solves the entire problem.

No workman possesses sufficient skill or quickness of eye and movement to operate an engine lathe—on thread cutting—up to the limit of cutting speeds alone, but if the necessary movements are performed automatically, those speeds can be realized and the workman is free to attend to other matters while the operations are in progress, such as running several lathes or other machines in conjunction with the lathes simultaneously.

DESCRIPTION FIGS. 11041 AND 11042.

There is no operation in the machine shop requiring more care and consuming more time in proportion to its simplicity than the cutting of screw and worm threads. The forming of such threads with dies and taps answers all purposes for speed of production, but falls short of the accuracy which modern practice demands.

Their production by some method better than the slow and expensive ones hitherto employed is demanded and has long occupied the attention of machine designers with varying success. The problem—whether a screw or worm thread is to be considered—is practically the same, but the means to be employed differ largely in the judgment of inventors.

The mechanic is apt to think that little need be said about the threading tools themselves. Certainly the man who attends an engine lathe—and has done so for years—has good reasons for thinking that he knows just how his tools should be formed, and used, but he will admit that whenever he can get a shearing cut, he can remove stock faster, generate less heat, and secure a better finish than with a blunt edge and "hogging" cut.

Few cutting tools will remove stock faster than the circular milling cutter, and because of this its attractiveness is very great, and justly so, if that were the whole desideratum. All threads are not angular, nor external, indeed it is a moot question whether accurately pitched screws should have angular or square threads. With the turning method of production it matters not which may be wanted, while with the milling method, neither external square threads nor internal threads of any form (unless the diameter is unusually large) can be produced, neither can they be cut close to shoulders, the experience of thousands of users throughout further change, brought about by improvement

10" X 8' GEAR-DRIVE LATHE.

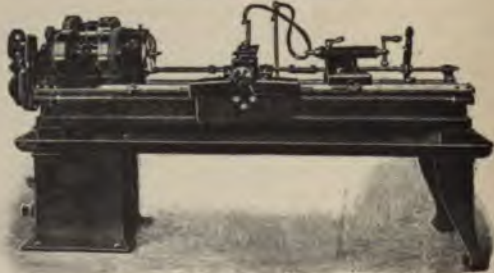


FIG. 11042.

SPECIFICATIONS.

	16" Belted.	16" Geared.	20" Geared.	23" Geared.
Rated size.....	16"	16"	20"	23"
Length of bed.....	6'	8'	8'	12'
Between centers.....	32"	32"	30"	72"
Maximum diameter will thread.....	2"	3"	6"	8"
Leads to.....	1 1/2"	1"	4"	6"
Weight.....	2,000 lbs.	2,200 lbs.	3,900 lbs.	8,900 lbs.

*These figures are standard. Other lengths can be furnished to suit conditions.

Taper attachment, tap relieving attachment (for 16" only) and other accessories can be furnished if desired.

24" SHAFTING LATHE.

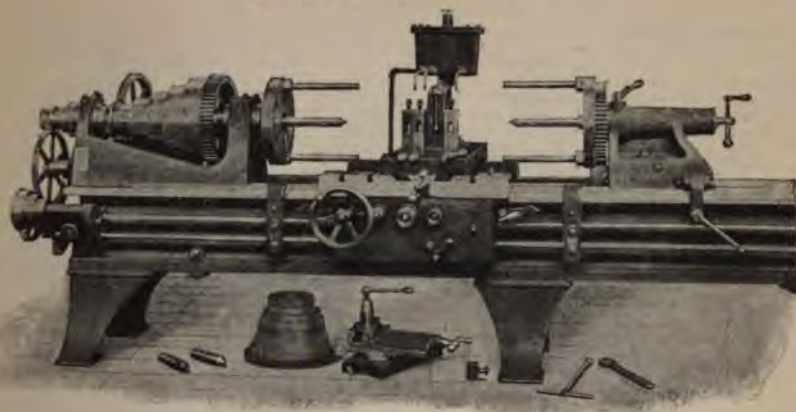


FIG. 11043.

DESCRIPTION FIG. 11043.

Our 24" engine lathe is so constructed that it is converted into a modern shafting lathe, capable of competing with lathes designed for that purpose only, and still so arranged that the lathe can be used as a regular engine lathe. The shafting rest is arranged to be placed on the carriage in place of the regular compound rest, and when in position engages the gear on pump shaft to gear on shaft extending the entire length of bed. Three tool rests are used, two to the left and one to the right of the massive follow rest, all on the front side of the carriage, easy to be manipulated by the operator and in the best position for accurate results. The tumbler gear under the head stock engages with face gear when it is desired to use the tail stock drive in transmitting the motion to the shaft. As this is only required a small percentage of the time, arrangements are made to disconnect the tumbler gear.

We wish to call your attention to the substantial manner in which the tail stock spindle is clamped, and the large wearing surface allowed for the face gear and face plate on tail stock. The method used in guiding shaft in follow rest is simply in connection with the use of cylindrical cast-iron split collars for each diameter to be turned. The cost of these collars is very slight, and the fact that they present nearly their complete inner surface for wear to the shaft makes their life long and permits turning the shaft with great rapidity, as well as accuracy. The copious supply of lubricant to the cutting edges of the tools is one of the essential requisites of shaft turning. To meet this requirement a duplex single-acting plunger force pump is bolted under the water reservoir of the shafting rest, from which it receives its supply. Water is forced up into a tank elevated enough to bring the supply tubes about the right height over the tools.

This tank is arranged with an automatic relief valve susceptible of adjustment so that various pressures may be obtained. When the lathe is started up it is unnecessary for the operator to give the pump any attention whatever, inasmuch as it provides for the automatic overflow, should no water be required. The hangers which support the lead screw and the pump shafts are automatically engaged and dropped into the proper position to keep the lead screw in line.

It is only necessary to remove the shafting rest, and replace the compound rest, disconnect the tumbler gear under the head stock and the lathe is ready to perform any of the functions required of an engine lathe.

This lathe was designed primarily for the purpose of turning shafting as well as regular engine lathe work, and is capable of handling shafts up to 5" in diameter and 32" in length.

Our 24" shafting lathe is really a rearrangement of our 24" engine lathe. It is furnished with the regular change gears of the engine lathe, so that the shafting lathe can be used for cutting all the threads which can be cut on a regular engine lathe, although the prime object of the gears is to transmit the motion for the feed.

The makers of shafting in this country usually use the lead screw for feeding the carriage when turning shafting, but, as our lathe has been so constructed that either the lead screw or the regular feed mechanism (rock and pinion) may be used, we wish to state whether either is preferable, and it is difficult to state whether either possesses

24" SHAFTING LATHE.

DESCRIPTION FIG. 11043.—Continued.

The bushings required in shafting rest, to support shaft accurately while being turned, are simply bored to the size the shaft is turned by the second tool, and turned on the outside to fit the bore of shafting rest, and then split so that a little compression may be used in connection with the set screw to hold bush in position. If the user will designate the size desired, we will always furnish one bush complete, which will then serve as a pattern for the user of the machine, as he must make the other bushes he requires.

The long centers used are a necessity, as they must reach through the bushing in the rest, which bushing is, of course, mainly depended upon to support the shaft during the cut, and is made of cast iron to fit the shaft, thus securing a reliable and satisfactory support.

We make the 24" shafting lathe to take in up to 32" between centers, and it is to be noted that 8" additional length are required to make a lathe 32" between centers, namely, 40" bed, and this calculation can be maintained for any length less than 40".

Unless otherwise ordered, we shall always send a complete engine lathe with all the necessary rests and parts, namely: compound rest, steady rest, follow rest, full swing rest and large and small face plates, and proportionate deduction made if these latter additions are not wanted.

PRINCIPAL DIMENSIONS.

Front bearing, 4" in diameter by 7" long.
 Back bearing, 3 $\frac{1}{4}$ " in diameter by 4 $\frac{1}{2}$ " long.
 Diameter of hole through spindle, 1 $\frac{1}{2}$ ".
 Cone diameter (5 steps), 6", 8 $\frac{1}{2}$ ", 11", 13 $\frac{1}{2}$ ", 16".
 Width of belt, 3 $\frac{1}{2}$ ". Ratio of back gearing, 12 to 1.
 Diameter of tail stock spindle, 2 $\frac{1}{4}$ ". Movement, 9".
 Cut screws from 1 to 16 per inch, including 1 $\frac{1}{2}$ " for pipe thread.

Feeds per inch, 4 to 65.
 Size of friction pulleys on countershaft, 16" x 5 $\frac{1}{2}$ " for 5" belt.
 Countershaft should run 90 revolutions per minute.
 Swing over bed, 24 $\frac{1}{4}$ "; over carriage, 16".
 Length between centers on 10" bed, 5".
 Shafting lathe, turns up to 5" diameter.

SHIPPING WEIGHTS, ETC.

30' between Centers.

Three cases	1—21' x 3' 6" x 3' 6".....	257 cubic feet
	1—19' x 2' x 2'.....	81 cubic feet
	1—20' x 1' x 1' 6".....	58 cubic feet
		396 cubic feet
Total net weight.....		13,000 lbs.
Total gross weight.....		15,500 lbs.

GAP ENGINE LATHES.

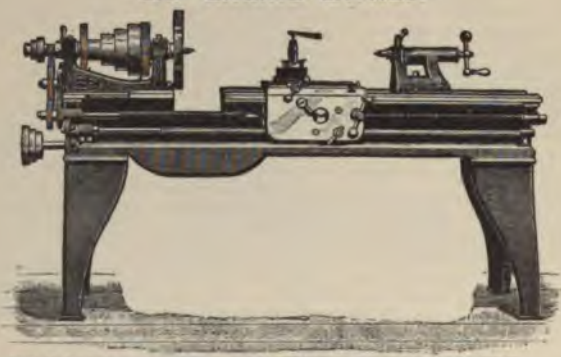


FIG. 11044.

DESCRIPTION FIG. 11044.

This lathe is built to swing 13", 14" or 15" over the ways, can be furnished with either plain or compound rest and with or without bridge piece to fill gap when not in use.

General specifications are the same as for regular engine lathes shown in Fig. 11007, page 5, to which refer.

Swings in gap.....	13" Lathe. 20" x 7"	14" Lathe. 21" x 7"	15" Lathe. 22" x 7"
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EXTENSION BED GAP ENGINE LATHES.



FIG. 11045.

DESCRIPTION FIG. 11045.

These lathes are built in four sizes and are designed especially for repair or jobbing shops. As an improvement on gap lathes, the extension feature permits making the gap wide or narrow to suit the work, also allows turning a much longer shaft as the distance between centers may be doubled by extension of top portion of bed. Ample power to turn full diameter of swing over lower bed, has capacity for a wide range of work, is handy, and not awkward to operate.

PRINCIPAL DIMENSIONS.

	22" and 20"	28" and 48"	36" and 60"	48" and 72"
Swing over top shears.....	25"	28"	36"	48"
Swing over lower guides.....	39"	48"	60"	72"
Swing over carriage.....	19"	21"	25½"	29"
Ratio of back gearing.....	25, 1/2	38	35, 1/2	53, 1/2
Leverage of cone and gearing.....	100, 1/2	112	136	221
Cuts all regular threads (including 11½ per inch pipe thread).....	1 to 22	½ to 16	½ to 14	½ to 16
Feeds per inch.....	3.5 to 77	2.3 to 74.6	1.7 to 52	1.9 to 54.6
Cone diameters.....	16", 13½", 11½", 9¼", 7"	18", 15½", 13¾", 10½", 8"	23", 19¾", 16½", 13¾", 10"	28", 24½", 21", 17½", 13½"
Face of cone steps.....	3½"	3½"	4½"	4½"
Front bearing of spindle.....	3½" diameter 5½" long	4½" diameter 6½" long	5" diameter 7½" long	6" diameter 9" long
Back bearing of spindle.....	2½" diameter 3½" long	2½" diameter 3½" long	2½" diameter 4" long	3½" diameter 4½" long
Tail spindle.....	2½" diameter 15½" long	3" diameter 19" long	3½" diameter 22" long	4" diameter 24" long
Length of bed.....	12½'	13½'	14, V'	15½'
Distance between centers.....	8' closed..... 15' extended.....	8' 15'	8' 15'	8' 15'
Countershaft, three pulleys.....	10" x 7"	22" x 8"	24" x 8"	24" x 8"
Countershaft, two pulleys.....	22" x 4"	.....	.....	.....
Speed of countershaft, three pulleys, R. P. M.....	85	80	80	110
Speed of countershaft, two pulleys, R. P. M.....	54	.....	.....	.....
Weight.....	6,500 lbs.	9,700 lbs.	15,000 lbs.	19,000 lbs.

9" AND 11" SCREW CUTTING FOOT LATHES.



FIG. 11046.

DESCRIPTION FIG. 11046.

Foot power. Our patented foot power by which the operator can obtain more leverage and produce greater power with less fatigue than with any other kind in use, consists of double treadles with a walking motion. The treadles are adjustable and work alternately, being connected at opposite ends of the driving-wheel shaft in such a manner as to produce a strong positive and continuous power. Can be started or stopped instantly and may be operated with both feet sitting or one foot standing as desired. This arrangement overcomes that objection of the operator being confined to one position.

These lathes are furnished with either plain or compound rest.

In ordering, specify which is wanted.

SPECIFICATIONS, FIG. 11046.

Numbers of Lathes.	Rated Swing.	Actual Swing Over Bed.	Distance Between Centers.	Length of Bed.	Floor Space Over All.	Net Weight.
10	9"	10 1/8"	24"	46"	25" x 53"	445 lbs.
20	9"	10 1/8"	36"	58"	25" x 65"	480 lbs.
25	11"	12 1/2"	24"	50"	27" x 60"	665 lbs.
30	11"	12 1/2"	36"	62"	27" x 72"	715 lbs.
40	11"	12 1/2"	48"	74"	27" x 84"	765 lbs.
50	11"	12 1/2"	60"	86"	27" x 96"	815 lbs.

9" FOOT POWER ENGINE LATHE.

WITH PLAIN REST AND POWER CROSS FEED.

DESCRIPTION FIG. 11047.

The lathe is furnished complete with either plain or compound rest, independent friction feed, face plate, full set of screw-cutting gears, steady rest and wrenches. Improved taper attachment can also be furnished, when desired, at extra cost. Special circular describing this lathe on application.

GENERAL DIMENSIONS.

Swing over bed, 10".
 Swing over rest, 6 1/2".
 Diameter of hole through spindle, 5/8".
 Center hole in spindles, Morse taper No. 2.
 Face plate screw, 1 1/4", 12 threads.
 Front bearing, 1 1/4" x 2 1/4".
 Back bearing, 1" x 2".
 Three-step cone, 5 1/2", 4 1/2", and 2 1/2" x 1 1/2".
 Ratio of back gearing, 8 to 1.
 Diameter of tail spindle, 1".
 Width of top of bed, 8".
 With English lead screw, cuts threads 6 to 72.
 With metric lead screw, cuts threads .6 mm. to .5 mm.
 Size of tool, 1/2" x 1/4" steel.
 Distance between centers, 24".
 Distance between centers, 36".
 Net weight with 24" centers, 400 lbs.; boxed, 550 lbs.
 Can be furnished with countershaft.



FIG. 11047.

10" FOOT POWER ENGINE LATHE. WITH PLAIN REST AND POWER CROSS FEED.

DESCRIPTION FIG. 11048.

The lathe is furnished complete with either plain, raise and fall, or compound rest, independent friction feed, large and small face plates, full set of screw-cutting gears, steady rest and wrenches.

Improved taper attachment can also be furnished when desired at extra cost. The taper attachment or power cross feed will not be furnished with raise or fall rest.

GENERAL DIMENSIONS.

Swing over bed, 11"
Swing over plain rest, 7"
Swing over compound rest, 6"
Diameter of hole through spindle, $\frac{5}{8}$ "
Center hole in spindle, Morse taper No. 2

Face plate screw, $1\frac{1}{4}$ ", 12 threads.
Front bearing, $1\frac{1}{2}$ " x 3"
Back bearing, $1\frac{1}{2}$ " x 2 $\frac{1}{4}$ "
Three-step cone, $6\frac{1}{4}$ ", $4\frac{1}{2}$ " and $3\frac{1}{2}$ " & $1\frac{1}{2}$ "

Ratio of back gearing, 8 to 1.
With the countershaft making 150 turns, speed of spindle is 9 $\frac{1}{2}$ -19-38 75-150-300
Diameter of tail spindle, $1\frac{1}{8}$ "
Width of top of bed, $8\frac{3}{4}$ "

With English lead screw cuts thread 5 to 72.
With metric lead screw cuts thread 6 mm. to .5 mm.

FRICTION FEED.

With lathe geared 36 and 36, 32 to 1 inch
With lathe geared 36 and 52, 45 to 1 inch.
With lathe geared 36 and 72, 65 to 1 inch.
With lathe geared 18 and 48, 85 to 1 inch.
With lathe geared 18 and 50, 105 to 1 inch.
Size of tool, $\frac{3}{4}$ " x $\frac{1}{2}$ " steel.
Distance between centers, 4' bed, 25"
Distance between centers, 5' bed, 38"
Net weight with 4' bed, 525 lbs.; boxed, 675 lbs.
Can be furnished with countershaft.



FIG. 11048.

12" SWING FOOT POWER ENGINE LATHE. WITH RAISE AND FALL REST

SPECIFICATIONS.

Swing over bed, 12 $\frac{1}{2}$ "
Swing over raise and fall rest, 7"
Swing over compound rest, 7 $\frac{1}{2}$ "
Swing over plain rest, 8".
Diameter of hole through spindle, $\frac{5}{8}$ ".
Center hole in spindles, Morse taper No. 2.
Face plate screw, $1\frac{1}{4}$ ", 10 threads.
Size of tool, $\frac{3}{8}$ " x $\frac{1}{4}$ " steel.
Distance between centers, with 4' bed, 24".
Distance between centers, with 5' bed, 30"
Distance between centers, with 6' bed, 49".
Four-step cone, 7", 5 $\frac{1}{2}$ ", 4 $\frac{1}{2}$ ", and 2 $\frac{3}{4}$ ", by 15 $\frac{1}{4}$ ".
Net weight, with 4' bed, 580 lbs.; boxed, 730 lbs.
Net weight, with 5' bed, 640 lbs.; boxed, 800 lbs.
Net weight, with 6' bed, 700 lbs.; boxed, 875 lbs.
Made with any style rest.
Can be furnished with countershaft.
Taper attachment with plain or compound rest, extra.



FIG. 11049.

9" AND 10" SCREW CUTTING FOOT LATHES.

DESCRIPTION FIG. 11050.

These lathes are furnished with either plain or compound rest.

SPECIFICATIONS.

Swing over bed	9"	11"
Length of bed*	40"	48"
Takes between centers	25"	28"
Swing over carriage	7"	8"
Weight	300 lbs.	470 lbs.
Hole in spindle	$\frac{1}{2}$ "	$\frac{5}{8}$ "

* Longer beds can be furnished if desired.



FIG. 11050.

13" SCREW CUTTING FOOT LATHE.

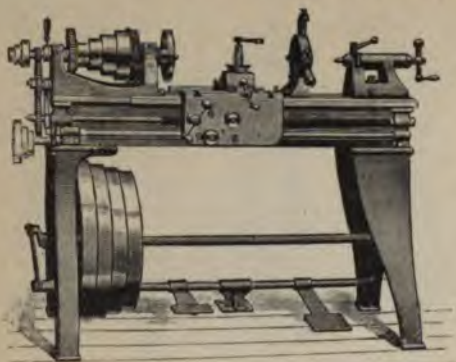


FIG. 11051.

DESCRIPTION FIG. 11051.

This lathe is built with either plain or compound rest, as desired.

SPECIFICATIONS.

Swing over bed.....	13"
Swing over carriage.....	7½"
Length of bed.....	6'
Takes between centers.....	40"
Front spindle bearing.....	2½" x 3½"
Hole through spindle.....	1½"
Cuts thread per inch.....	5 to 36
Weight.....	1,100 lbs.

Taper attachment, gap bed, or countershaft for belt power can be furnished at extra cost.



FIG. 11052.

GEAR CUTTING ATTACHMENT.

DESCRIPTION FIG. 11052.

This novel device for cutting the teeth of spur, bevel, and miter gears can be attached to the tool carriage of any of our lathes. It has a taper hole in the sliding head to take spindle for carrying blanks to be cut, the cutters to be run on a mandrel between the lathe centers. The head of attachment has a vertical adjustment of 4", which is operated by a square-threaded steel screw, the stud being also steel, and the gear wheel cast iron. It has an unlimited capacity. Wheels of any diameter and width of face can be cut by it. Two index plates are furnished with each machine, also index card. It can also be used for laying out cutters, marking and spacing, and a variety of other purposes. For workmanship and accuracy it cannot be excelled.

LATHE TOOLS.

DESCRIPTION FIG. 11053.

These tools are hand forged from the best tool steel, and can be furnished in sets of twelve or sixteen, in sizes to fit any tool post.

- | | |
|---|-------------------------|
| 1 Left side tool. | 9 Round nose. |
| 2 Right side tool. | 10 Water finishing tool |
| 3 Left side tool, bent. | 11 Cutting off tool. |
| 4 Right side tool, bent. | 12 Roughing tool. |
| 5 Heavy diamond point for cast iron. | 13 Thread tool. |
| 6 Diamond point for steel and wrought iron, right hand. | 14 Bent thread tool. |
| 7 Diamond point for steel and wrought iron, left hand. | 15 Inside turning tool. |
| 8 Half diamond point. | 16 Inside thread tool. |



FIG. 11053.

11" BENCH SPEED LATHE.

SPECIFICATIONS, FIG. 11054.

	11" x 3"	11" x 4"
Distance between centers.....	15"	27"
Hole in spindle.....	3/8"	3/8"
Largest diameter of cone.....	7"	7"
Width of belt.....	1 1/2"	1 1/2"
Front bearing.....	2 3/8" x 1 3/8"	2 3/8" x 1 3/8"
Rear bearing.....	2 1/4" x 1 3/8"	2 1/4" x 1 1/4"
Speed of countershaft.....	350	350
Net weight, about.....	210 lbs.	235 lbs.



FIG. 11054.

These lathes can be furnished with 5' or 6' beds, if desired.
Plain countershaft furnished with each lathe.

IMPROVED SPEED LATHES.

11", 13" AND 16" SWING.



FIG. 11055.



FIG. 11056.

DESCRIPTION FIGS. 11055 AND 11056.

These lathes are usually supplied with the regular wheel and lever tail stock as shown in Fig. 11055. A set over swivel tail stock, Fig. 11056 can be furnished if desired.

SPECIFICATIONS.

SIZES	11"	11"	11"	11"	13"	13"	13"	13"	16"	16"	16"	16"
	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Distance between centers.....	15"	27"	39"	51"	36"	48"	72"	96"	42"	66"	90"	114"
Hole in spindle.....	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Largest diameter of cone.....	7"	7"	7"	7"	8 1/2"	8 1/2"	8 1/2"	8 1/2"	10"	10"	10"	10"
Width of belt.....	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Length of front bearings.....	2 3/8"	2 3/8"	2 3/8"	2 3/8"	3"	3"	3"	3"	3 1/2"	3 1/2"	3 1/2"	3 1/2"
Length of rear bearings.....	2 1/4"	2 1/4"	2 1/4"	2 1/4"	2 3/4"	2 3/4"	2 3/4"	2 3/4"	2 3/4"	2 3/4"	2 3/4"	2 3/4"
Diameter of front bearings.....	1 5/8"	1 5/8"	1 5/8"	1 5/8"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	2 1/4"	2 1/4"	2 1/4"	2 1/4"
Diameter of rear bearings.....	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"
Speed of countershaft, about.....	350	350	350	350	250	250	250	250	225	225	225	225
Weight, about, lbs.....	310	335	365	405	510	550	640	800				1,150

11" SPEED LATHE FOR FOOT OR BELT POWER



FIG. 11057.

DESCRIPTION FIGS. 11057 AND 11058.

Special attention is directed to foot-power lathe shown in Fig. 11057. This device gives a powerful leverage with an easy motion. The shaft runs in roller bearings.

The lathe can be furnished with countershaft for belt power instead of the foot-power attachment, if so desired, as shown in Fig. 11058.

Various attachments can be supplied for either style of lathe. These are as follows:

- Turret head with four holes for tools.
- Slide rest, having longitudinal feed of 8" and cross feed of 4". (Shown in Fig. 11058.)
- Strap polishing attachment.
- Countershaft.
- Regular wheel and lever.
- Tail stock.
- Hand rests and centers are part of the regular equipment.



FIG. 11058.

SPECIFICATIONS.

	FOOT POWER. 4' Bed.	BELT POWER. 4' Bed.	BELT POWER. 5' Bed.
Swings over ways.....	11"	11"	11"
Distance between centers.....	26"	26"	38"
Diameter of hole through spindle.....	3/8"	3/8"	3/8"
Speed of countershaft.....	.....	300 R. P. M.	300 R. P. M.
Net weight.....	.....	300 lbs.	350 lbs.
Gross weight, boxed for export.....	575 lbs.	488 lbs.	.....
Cubic feet, boxed for export.....	23	16	.....

11" SPEED LATHE WITH COMBINATION WHEEL AND LEVER TAIL STOCK.

DESCRIPTION FIG. 11059.

Head and tail spindles are made of crucible steel, size of hole in spindle, $\frac{3}{8}$ " ; front bearing, $1\frac{1}{2} \times 2\frac{3}{4}$ " ; composition boxes. Size of cone; small section, $2\frac{1}{2}$ " ; large, $6\frac{1}{2}$ " ; $1\frac{1}{2}$ " face.

Tail spindle is easily changed from a wheel to lever feed and vice versa. There is a shelf on the back of bed for tools. The binders for rest and tail stock are convenient and effective.

Regular length of beds, 4' and 5', any other when ordered.

Shipping weight of 4' bed, with countershaft 300 lbs.



FIG. 11059.

10", 12" AND 14" HAND OR SPEED LATHES.

SPECIFICATIONS FIG. 11060.



FIG. 11060.

Swive	Length of Bed.	No. of Slideways on Cones.	Width of Cones.	Slide through Spindles.	Motor Taper.	Distance between Centers.	Weight on Slide.
10"	4'	3	15 1/2"	3 1/2"	No. 2	24"	300
10"	5'	3	15 1/2"	3 1/2"	No. 2	30"	330
12"	4'	4	17 1/2"	3 1/2"	No. 2	24"	440
12"	5'	4	17 1/2"	3 1/2"	No. 2	30"	480
12"	6'	4	17 1/2"	3 1/2"	No. 2	48"	530
14"	6'	4	23 1/2"	3 1/2"	No. 3	43"	700
14"	8'	4	23 1/2"	3 1/2"	No. 3	67"	745

Note: Can be furnished for foot power, if desired.

MOTOR DRIVEN SPEED LATHE.

DESCRIPTION FIG. 11061.

This cut illustrates one of our new motor-driven speed lathes. The motor is of the constant speed type and is set on the floor or on a suitable bracket and belts to a pulley which drives a countershaft at the back of the lathe head. This shaft is run in self-oiling bearings, mounted upon a swinging frame which is hinged to the back of the lathe and is provided with a screw operated by a ball handle at the front to tighten or loosen the belt which runs from the cone pulley on countershaft to cone pulley on head spindle, as desired. The head of this lathe has self-oiling, bronze bearings and may be placed on the bed as shown, or reversed as is usual for speed lathes.

For specifications of sizes see Fig. 11055, page 45.



FIG. 11061.

SLIDE RESTS FOR USE ON SPEED LATHES.



FIG. 11062.

SLIDE REST, FIG. 11062.

This slide rest is of improved pattern, has a lateral travel of $5\frac{3}{4}$ " and a cross travel of $2\frac{1}{2}$ "

It can be easily fitted to any speed lathe of from 9" to 14" swing.

Tool post, wedge, wrench and all parts shown in cut come with each rest.

SLIDE REST, FIG. 11063.

This slide rest is designed for use on speed lathes of 11", 13" and 16" swing and can be easily fitted to any lathe. It is strong, substantial and well made throughout.



FIG. 11063.

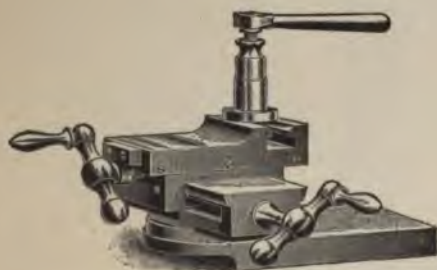


FIG. 11064.

PLAIN SLIDE REST, FIG. 11064.

No. 1. Suitable for 15" lathe.

No. 2. Suitable for 13" lathe.

No. 3. Suitable for 9" or 10" lathe.

COMPOUND SLIDE REST, FIG. 11065.

No. 00. Suitable for 20" lathe.

No. 0. Suitable for 18" lathe.



FIG. 11065.

NO. 2 PRESS ON STAND.



FIG. 11066.

NO. 3 PRESS (ON LATHE BED.)



FIG. 11067.

GREENERD ARBOR PRESSES.

DESCRIPTION FIGS. 11066 TO 11069.

These presses are by far the most satisfactory devices ever produced for driving arbors or mandrels into and out of machine-shop work. They save time and finished work and their use is a sure preventive against injury to the arbors themselves.

The use of these presses dispenses entirely with the vast collection of collars, sledges, hammers, and pieces of wood and habbit commonly found in shops where they are not known, and their low cost makes them a profitable investment for even the smallest machine shop.

The Greenerd arbor press is also handy for many other uses besides arbor work.

- No. 1 press. This press was designed for use on a universal grinding machine, for forcing arbors out of and onto very small work. Design is the same as No. 2, except that the base is planed flat.
- No. 2 press. Takes work 8" diameter and 1" arbors.
- No. 3 press. Suitable for use in connection with 14" or 16" engine lathes.
- No. 3½ and No. 3¾ presses. Similar to No. 3, but having pawl and ratchet on lever, also counterbalance.
- No. 4 press. Similar to No. 3¾, but provided with an adjustable knee having a movement of 12°
- No. 5 press. Has adjustable knee as shown in cut, also compound gearing for increasing leverage.
- No. 8 press. Takes 36° between uprights, 35° over plate, and develops 25 tons pressure.

SPECIFICATIONS.

No.	Table Diam. of Work	Largest Arbor	Height Over Lever	Height of Back or Run	Leverage	Total Height	Net Weight, lbs.	Weight, lbs. (stands, lbs.)
1	5½"	3½"	4¾"	6"	25-1	8"	15	...
2	8"	1"	7"	10"	35-1	14"	55	200
3	12"	1½"	11"	12"	45-1	17"	90	250
3½	19"	3"	15"	18"	55-1	23"	360	350
3¾	22"	3"	21"	24"	55-1	34"	400	350
4	19"	3"	27"	18"	55-1	57"	850	...
5	26"	4"	32"	24"	135-1	65"	1,400	...
8	36"	7"	35"	48"	250-1	70"	2,000	...

NO. 5 PRESS.



FIG. 11068.

NO. 8 PRESS.



FIG.

Note: The No. 1 press is made for bench use only. Nos. 2, 3, 3½ and 3¾ can be furnished with stands at extra cost. Nos. 4, 5 and 8 require no stands, being designed to set on floor.

LATHE CENTER GRINDERS.

BELT-DRIVEN CENTER GRINDER.



FIG. 11070.

DESCRIPTION FIG. 11070.

A small emery wheel is suitably mounted to receive motion from the lathe as shown. The driving pulley *A* is placed against the face plate, quickly centered, and temporarily held in place by a cup piece [with the dead center brought up against it] then secured by two bolts.

The casting *C* is set over the tool post and secured by a short bar through the slot, after adjusting to angle desired for grinding center.

Setting the two half-circle points in line with face plate, or at right angles with shears of lathe, sixty degrees, the usual angle for centers, is obtained. Any other angle, however, may as readily be had.

Center of emery wheel should be at same height as lathe center.

DESCRIPTION FIG. 11071.

This grinder is intended more especially for use on small lathes where but little grinding is required to keep the centers in perfect shape.

This machine takes spindles up to $2\frac{1}{2}$ " in diameter, and is regularly made to grind either the standard angle of sixty degrees or fifty-five degrees as desired.

Hand power is all right for small lathes, and the use of the sprocket wheels and chain gives a very easy and quiet running machine, a speed of 2,000 turns per minute for the wheel being readily obtained.

It requires but very little grinding to keep your lathe centers in perfect shape when hardened, and you will find it only a pleasure to frequently touch up the center when it can be done so quickly and satisfactorily.

HAND-DRIVEN CENTER GRINDER.

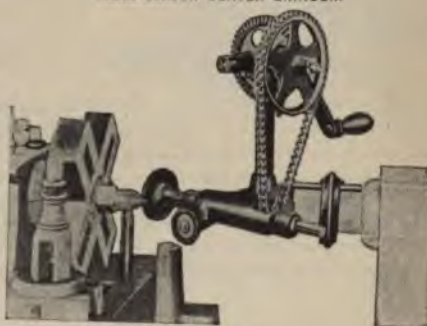


FIG. 11071.

FRICION-DRIVEN CENTER GRINDER.



FIG. 11072.

DESCRIPTION FIG. 11072.

This style of machine has been made adjustable so that centers of any angle from fifty-five to seventy-five degrees can be ground, which is a very desirable feature in many shops which may have some other angle than sixty degrees for a standard.

This machine can be kept set up to any special angle, or can be changed to different angles as frequently as desired in a moment's time.

The V-shaped holder which clamps on the tail spindle is made large enough for spindles up to 3" in diameter.

As will be seen from the cut, the power is obtained from the largest step of the cone, and is transmitted through a universal joint and pair of bevel gears to the grinding spindle, giving a high speed to the grinding wheel.

This makes a splendid method of obtaining the power, being the simplest and most direct construction possible. It avoids all trouble from slipping of bolts or in making connections with face plates, pulleys, etc., which are sure to be inconvenient and unsatisfactory, and to require much time to adjust, even if none of the loose parts get mislaid.

MOTOR DRIVEN CENTER GRINDERS.

DESCRIPTION FIG. 11073.

These grinders are set up by simply clamping them on the tail spindle of the lathe, the simplest arrangement ever devised for getting the angle just right every time.

The motor we use is an especially fine one for the work, and our method of mounting it above the grinding spindle gives better bearings for all parts and makes it more convenient to operate. It reduces vibration of the grinding wheel, which works much smoother than is possible when the motor is built around the spindle and the whole machine has to be fed back and forth to get across the work.

Style No. 44 or No. 45, shown by cut, grinds one angle only, and takes spindles up to $2\frac{1}{2}$ " in diameter.

Style No. 46 is similar to style No. 44, except that the frame is made in two parts which are adjustable, so that any angle of center can be ground from 55 degrees to 75 degrees. It is also a little larger in size, taking spindles up to 3" in diameter.

When lathe centers are ground in place, you can be absolutely sure that they will run true.

You cannot be sure of this if they are ground in any other way.

Tail centers can also be kept in good condition without annealing and rehardening.

Any of these styles will do splendid work and do it quicker than any other machine on the market, and if you want to improve the quality of your lathe work and lessen its cost, you should let us send you one of these machines at once.

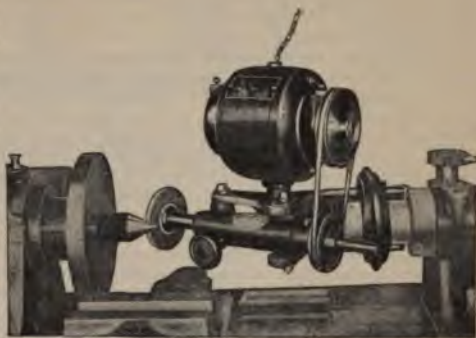


FIG. 11073.

8" PRECISION BENCH LATHE.

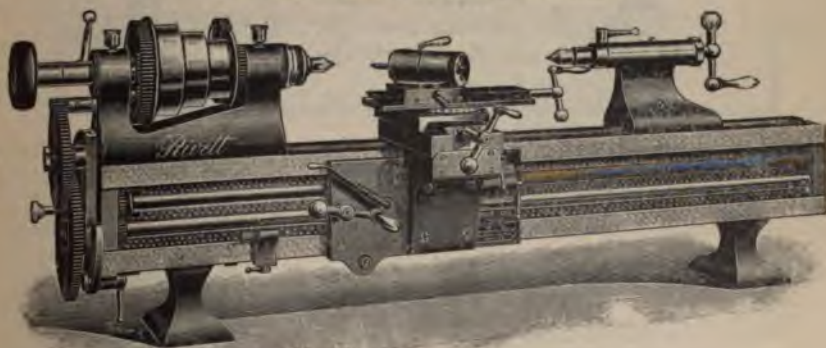


FIG. 11074.

DESCRIPTION FIG. 11074.

Our 8" precision lathe, shown in the above cut, is built for engineers, tool makers, scientists, and skilled operators of every profession and is the most complete tool of the kind ever conceived. With this lathe starting with plain turning, the operations which may be performed are endless, and the operator has the satisfaction of knowing that they

8" PRECISION BENCH LATHE.

DESCRIPTION FIG. 11074.—Continued.

The lathe bed is 40" long, of the best grade of cast iron, planed, milled, and scrape finished, polished on all sides. Distance between centers, 22"; swing, 8½". The large spindle bearing is 2½" in diameter, and tapered at converging angles nearest to the curve of least resistance, both spindle bearings being 2½" long.

The bearings are not boxes of iron, bronze, or softer alloys with caps to tighten until the journals are ruined and the alignment lost, but are cylindrical in form, of the best tool steel, and like the spindles are made as hard as fire and mercury will make them, and then ground with diamond to a perfect fit.

The carriage is gibbed to the side of the bed, the Ys being internal and out of the way of chips, as are also the feed rod and lead screw. The lead screw is cut from the steel best adapted for such work, and with one of the best master screws in the country. Both long and cross feeds are automatic, the former controlled by the friction gear, acknowledged to be ahead of any other in simplicity and strength of its grip, and the latter thrown in or out by the regular lever movement. The long feed is also regulated by an automatic stop, which may be adjusted to any point on the bed. The full capacity of the long feed is the whole of the distance between centers.

This lathe is in daily use, chasing fine taps in the shops of some of our finest tap manufacturers; on this work where great accuracy is necessary, it is of great advantage.

The change gears apply the same to the lead screw of the lathe and that of the compound rest.

A large variety of attachments can be furnished for this lathe, information in regard to which will be sent on application.

No. 5 MANUFACTURER'S BENCH LATHE.



FIG. 11075.

DESCRIPTION FIG. 11075.

This lathe has been designed especially for manufacturing, where there is needed a large capacity through the chucks.

The lathe is made, not as a good many are when the size of the chuck is increased—simply by making the hole through the spindle larger; but every part of the lathe is reinforced, so that with the increase in the size and capacity of the chuck it loses nothing in strength and rigidity.

We believe that this is the extreme in size and weight for a bench lathe; and while we would not recommend it to take the place of our toolmaker's lathe, we have determined to give the best lathe in the world for a reasonable price.

The slide rest to go with this lathe is of the ordinary pattern, though differing from that we formerly made for this lathe.

This lathe with our cutting off slide, which has proved such a success, the automatic chuck closer, and turret, makes the strongest and most complete screw machine in the country.

We invite requests for estimates from intending purchasers, as to what the lathe will do, and would say that though the lathe looks small in comparison with a 16" lathe, a good many of the latter have spindles no larger than are put into this lathe.

Hardened spindle, bushings hardened and ground, and the thread on the nose of the spindle is accurately ground so that jaw chuck and face plates may be used without injury to the spindle. Cone has steps 1½" wide, 3", 4" and 5" diameter.

Capacity of chucks is from ¼" to ¾", full size of chuck.

Length of bed, 38". Swing, 6". Distance between centers, 18".

Complete information in regard to special attachments, prices, etc., sent on application.

No. 3 PLAIN BENCH LATHE.



FIG. 11076.

DESCRIPTION FIG. 11076.

Plain lathe comprises—bed, head and tail stock, T or hand rest with binder bolt for same, and face plate and centers.

Bed. Unless otherwise ordered, bed will be made with plate or flange on head stock end; this plate end being scraped and fitted with standard groove and binder holes to receive the upright angle slide for milling purposes.

Head stock is strong and rigid and has large size spindle and bearings.

Bearings are of the well known two-angle form, having angles of 5 and 45 degrees. The back bearing is snugly fitted to spindle, and by means of a take-up nut this back bearing may be adjusted to take up the wear of spindle.

Spindle and bushings are made of the finest steel, the bearing parts, including the mouth of spindle, being hardened and accurately ground with special machinery and fitted with the greatest accuracy. Bearings are protected from dust and chips by means of dust caps. Back end of spindle is ground to standard outside diameter to receive gears used in connection with gear-cutting attachment.

Draw-in spindle is hollow.

When desired we will furnish these lathes with hardened and ground spindle and hard bronze bearings.

Cone has three steps, $2\frac{1}{2}$ ", $3\frac{1}{2}$ " and $4\frac{1}{2}$ " diameters, for 1" belt, and has index holes drilled in face of largest flange and suitable index pin for dividing circles, etc.

Tail stock is provided with graduated feed collar. Both head and tail stocks are secured to bed by means of quickly operated ram and bolt.

T or hand rest is secured in any position on bed, by bolt and hand nut.

Dimensions. Length of bed, 32". Swing, $7\frac{1}{4}$ ". Distance between centers, 18".

To meet the needs of our customers who do not wish the milling attachments in connection with the No. 3 lathes, we will furnish a lathe without the web on bed, if so desired.

LIST OF ATTACHMENTS FOR NO. 3 PLAIN BENCH LATHE.

(In ordering always advise what attachments are required.)

Slide rest.

Slide rest, large size, adapted for milling.

Countershaft, two speeds.

Countershaft, three speeds.

Grinding pulley and idlers used with regular countershaft.

Grinding countershaft, separate.

Screw-cutting and taper attachments.

Milling attachments, comprising upright angle slide, vice and index head.

Grinding fixture, No. 1 style.

Grinding fixture, No. 2 style.

Turner to go on tail stock.

Back rest.

Follower rest for use on slide rest.

Split chucks, steel, hardened and ground.

Steel step chucks, 2"

Step chucks, cast iron, 2"

Step chucks, cast iron, 3".

Arbor chucks for saws, mills, etc.

Arbor chucks, long, with collars.

Face plates, with tapped holes, 6" diameter.

Face plates, with milled T slots, 6" diameter.

Drill plate on center, for tail stock, 1"

Drill plate on center, for tail stock, 2"

Drill plate on center, for tail stock, 3"

Drill plate on center, for tail stock, 4"

Drill rest, V, plain.

Drill rest, V, revolvable.

Chucking rest.

Table rest, triangular.

Table rest, rectangular.

Lathe tools.

Inside threading tool.

Lathe tools made from high speed steel.

No. 5 PLAIN BENCH LATHE.

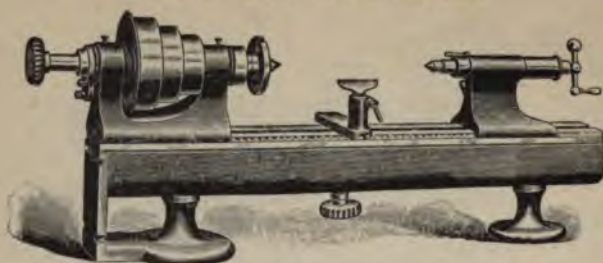


FIG. 11077.

DESCRIPTION FIG. 11077.

The call for a larger lathe than our No. 3, which should have a full line of our patented milling and other attachments, led us to place on the market the No. 5 size, which we believe will commend itself to all who may need a lathe of wide range and capacity for fine, accurate work.

This lathe is very solidly built throughout, and while it is adapted to do the most delicate and accurate work, its construction is such that cutting operations can be done with ease, that would tax the spindle efficiency of many engine lathes of much greater weight.

In the form of the bed, with flange on head-stock end, for securing upright angle milling slide; also in the form of spindle and spindle bearings, and in its general design it is quite similar to the No. 3 lathe.

Plain lathe comprises same list of parts as in No. 3 plain (see Fig. 11076).

Bed has flange or plate accurately scraped and fitted to receive milling slides.

Head stock is very solidly proportioned, and is secured to bed by two cam binders.

Spindle and bushings are hardened and ground, and bearings are of the same form as in No. 3. By an improved method of construction we are able to secure on the hardened front end of spindle, a collar which is threaded after spindle is ground and fitted, thus insuring a perfectly true thread for the purpose of attaching large plates or chucks to spindle. When not in use this thread is covered and protected by the brass cap or cover.

When desired we will furnish these lathes with hardened and ground spindles and hard bronze bearings.

Cone has three steps—4", 5", and 6" diameters for 1½" belts.

Tail stock has graduated feed collar.

Dimensions. Length of bed, 38". Swing, 9". Distance between centers, 18".

To meet the needs of customers who do not wish the milling attachments in connection with the No. 5 lathe, we will furnish a lathe without the web end on bed, if so desired.

LIST OF ATTACHMENTS FOR NO. 5 PLAIN BENCH LATHE.

(In ordering, always advise what attachments are required.)

Slide rest, for turning operations.	Step chucks, cast iron, 4".
Slide rest, extra large and heavy, adapted for milling and turning—with stop.	Chuck closer, 2".
Countershaft, two speeds.	Chuck closer, 3".
Countershaft, three speeds.	Chuck closer, 4".
Grinding pulley and idlers, used with regular countershaft.	Arbor chucks for saws, mills, etc.
Grinding countershaft, separate.	Arbor chucks, long, with collars.
Screw-cutting and taper attachment.	Face plates, with tapped holes 8" diameter.
Milling attachments, comprising upright angle slide, vise and index head.	Face plates, with milled T slots 8" diameter.
Grinding fixture, No. 1 style.	Drill plate on center, for tail stock, 1".
Grinding fixture, No. 2 style.	Drill plate on center, for tail stock, 2".
Turret to go on tail stock.	Drill plate on center, for tail stock, 3".
Turret attachment.	Drill plate on center, for tail stock, 4".
Cutting off slide rest.	Drill rest, V, plain.
Back or center rest.	Drill rest, V, revolvable.
Follower rest for use on slide rest.	Chucking rest.
Split chucks, steel, hardened and ground.	Table rest, triangular.
Step chucks, steel, 2".	Table rest, rectangular.
Step chucks, steel, 3".	Lathe tools.
Step chucks, cast iron, 2".	Inside threading tool.
Step chucks, cast iron, 3".	Lathe tools made from high speed steel.

UNIVERSAL TURRET LATHE WITH GEARED HEAD.

16", 18" OR 20" SWING.

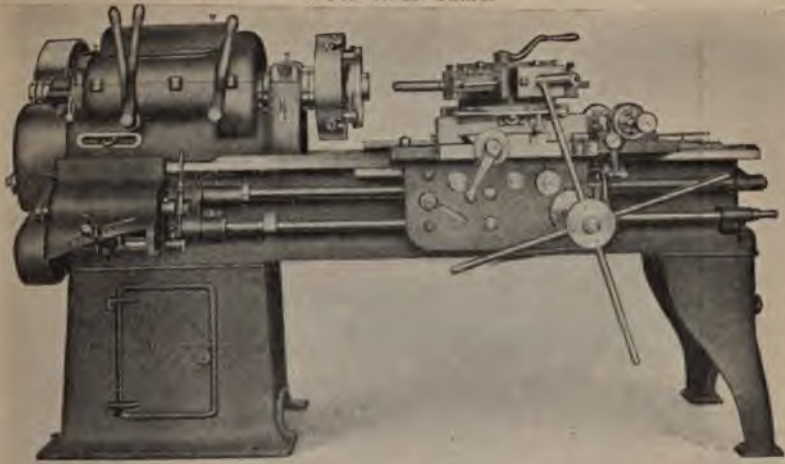


FIG. 11078.

DESCRIPTION FIG. 11078.

This machine is of new design throughout and is particularly adapted to work and finish castings from the rough. The geared head provides eight changes of speed and if desired two speeds can be obtained from the countershaft, giving sixteen spindle speeds in all, making this machine an ideal one on the above mentioned work. It is desirable to obtain from very slow speeds to comparatively high speeds on every casting of large diameter. This makes it necessary to have a great variety of speeds and to be able to obtain them instantaneously, and this is just what we have designed and built in this geared head machine. The operator can obtain any of these speeds by simply shifting the levers shown in cut on side of geared head. The feeds, which have a great range from fine to coarse, are also instantaneously changed. A lead screw is furnished with this machine, as it is often necessary to lead a tap positively.

The turret is hexagonal and is of very heavy construction and is provided with a power and hand cross feed, power and hand lateral feed, with a stop motion for the feeds in all directions. There are six adjustable stops arranged for the lateral feed and these stops revolve automatically with the turret, or if desired they can be used independently by disengaging the stop cylinder from the shaft by means of a clutch. This is so arranged, as it is sometimes necessary to use one tool for more than one operation. The cross feed is provided with twelve adjustable stops, six for each direction. These are numbered and are operated independent of the turret. The feeds can be engaged, disengaged, and reversed from the apron.

One very interesting feature of the machine is the cheapness of the tools. Tool holders can be readily made from castings for any job the operator wishes to do. The gear shown in the chuck of lathe in cut is a very good example of the value of this machine. This is a web gear and is finished all over. The hole is first bored with a double cutter, then is trued up with a single cutter boring tool and then is reamed to standard size. The hub and the face of the gear are faced off with tools shaped like ordinary lathe tools. The diameter of the hub is turned to size, and one half of the outside diameter of the gear is turned. The whole lot of the gears are partly finished as above described, then cast iron jaws are inserted in the chuck and trued up to the exact size of the outside diameter of the gear. The gears are then held in the chuck and the other side squared up, and the remaining portion of the outside diameter turned off, and it is then only necessary to put them on an arbor and take a light finishing chip for the outside diameter. It will be found that the gears do not run out as they would if they were roughed out on an arbor, as it is necessary to force the arbor in so tight in order to rough these gears out in an ordinary lathe that it distorts the hole. Not only are the gears finished better, but in about one third of the time that would be required to do the same work on an arbor in an ordinary lathe.

UNIVERSAL TURRET LATHE.

DESCRIPTION FIG. 11078.—Continued.

Each lathe is furnished with turret, quick change gear device, lead screw, feed rod, friction countershaft and four-jaw scroll combination chuck fitted to spindle.

Oil pan, oil pump and connections, taper attachment and compound rest and regular tail stock can be furnished in addition if desired.

SPECIFICATIONS.

Swing over ways	17½"	18"	20¼"
Front spindle bearing.....	5½" x 2½"	6" x 2½"	6" x 3"
Rear spindle bearing.....	3½" x 2½"	3½" x 2½"	3½" x 2½"
Hole in spindle.....	1¼"	1¼"	1¼"
Standard length of bed.....	7'	7'	8'
Driving pulley*.....	12" x 3"	14" x 4"	14" x 4"
Countershaft pulleys.....	12" x 3"	14" x 4"	14" x 4"
Speed of countershaft.....	350	350	350
Weight.....	2,800 lbs.	3,600 lbs.	4,400 lbs.
Size of chuck furnished.....	13"	13"	16"

*These lathes can be readily adapted for electrical drive by application of constant speed motor as described in Fig. 11040.

24" ENGINE LATHE WITH TURRET ON SPECIAL CARRIAGE. WITH FRICTION-GEARED HEAD, AND INDEPENDENT VARIABLE GEAR FEED.

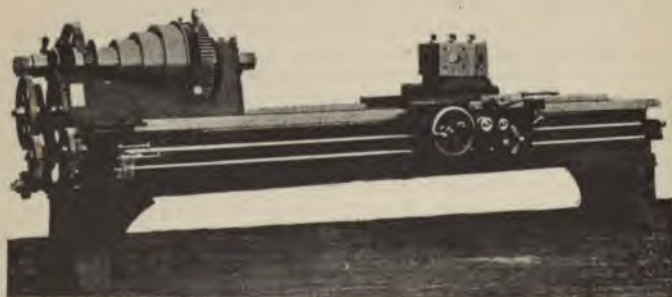


FIG. 11079.

For description see following page.

24" ENGINE LATHE WITH TURRET ON CARRIAGE—PLAIN.



FIG. 11080.

DESCRIPTION FIGS. 11079 AND 11080.

Presented herewith is an illustration of a 24" turret lathe intended for producing, economically, all work which can either be held in a chuck or clamped to a face plate, and permits of any operation possible with an ordinary engine lathe.

To facilitate all changes of cutting speeds and feeds, ample provision has been made, and with this in view the back gearing of head stock is engaged or disengaged by the clutch lever shown in front of head stock. The friction clutches are of recent design, and so arranged that all wear can be compensated for, and have sufficient power to obviate slipping under heaviest cuts.

The feed mechanism is driven independent from screw-cutting apparatus by a train of gears so arranged that six different ratios of feed are at instant command while the lathe is in motion.

The turret is hexagonal in form and 14" in width across the flats, the holes in same being $2\frac{1}{2}$ " in diameter, and the construction is such that a bar may be passed entirely through the turret. The uses of this arrangement commend themselves at once and require no further explanation.

The indexing is done with a hardened and ground pin, which is withdrawn by one of the levers shown on the right side of turret, whereas the other lever is used for clamping same. This makes a very convenient arrangement which leaves the working side of the turret free from all obstructions.

The regular engine lathe apron is applied to the carriage, which gives friction longitudinal feed, power cross feed, for the turret slide sufficient to face the full swing of the lathe and split nut to engage the lead screw for screw-cutting purposes.

A fixed stop at the rear of the carriage centers the turret, so that when boring bars are used, no difficulty is experienced in properly centering them.

The spindle is fitted with a hardened steel bush, so that the ends of long boring bars may be supported to permit of rapid and accurate work. It can be easily understood that any piece which must be bored, faced and turned on its periphery, threaded either inside or outside, can be finished on this machine without removing from the chuck, without the use of what might strictly be called special tools; therefore, where but few pieces of each kind are to be made this lathe will prove economical, and with the use of special fixtures large lots can be produced at the least possible cost.

PRINCIPAL DIMENSIONS.

Engine Lathe Proper.

Front bearing, 4" diameter by 7" long.
 Back gearing, $3\frac{1}{4}$ " diameter by $4\frac{1}{2}$ " long.
 Diameter of hole through spindle, $2\frac{1}{8}$ ".
 Cone diameters (four steps), 7", 10", 13", 16".
 Width of belt, $3\frac{1}{2}$ ". Ratio back gearing, 10 to 1.
 Cut screws from 1 to 16 per inch, including $1\frac{1}{2}$ " for pipe thread.
 Feeds per inch, 4 to 95.
 Size of friction pulleys on countershaft, $16" \times 5\frac{1}{2}"$ for 5" belt.
 Countershaft should run 90 revolutions per minute.
 Swing over bed, $24\frac{1}{2}"$.

DIMENSIONS OF TURRET AND SLIDE.

Width of turret, 14". Holes in turret, $2\frac{1}{2}"$ regular.
 Front slide, 14" wide, 20" long.

SHIPPING WEIGHTS, ETC.

Net weight of (Net weight (boxed,
 forsign), 6,500 lbs. Dimensions: 3' 6" x 136
 cubic feet.

18" LATHE WITH TURRET ON SPECIAL CARRIAGE AND FRICTION GEARED HEAD.



FIG. 11081.

DESCRIPTION FIG. 11081.

Demand for rapid lathe work, together with the increasing knowledge regarding the value of the turret lathe, has led to the adoption of the turret on carriage in place of the regular compound rest.

The lathe herewith represented is a modification of the standard 18" engine lathe to serve the purpose of a heavy turret lathe, a type which is becoming deservedly popular with the manufacturers of machinery. With the exception of the turret on carriage and turret slide, the regular design of the engine lathe has been maintained.

The addition of a friction-geared head, spindle to a standard engine lathe is very desirable, as this device is indispensable to screw machines, turret lathes, etc., and while it in a measure complicates the lathe and adds somewhat to its cost, its advantages are so great as to outweigh every other consideration many times. The frictions are carefully constructed, susceptible of ample and convenient adjustment for wear, and will give the services required of them during the life of the lathe.

The carriage is very heavy, gibbed to outside of bed, both front and back, and is fitted with a turret slide of unusual proportions—10" in width and 16" in length, upon which the turret proper revolves.

The turret is hexagonal in form and 10½" in width across the flats. The holes in same may be as large as 2" in diameter, and the construction is such that a bar may be passed entirely through the turret. The advantages of this arrangement are too numerous and well understood to require any further explanation. The index pin and clamping lever are on the right side of the turret, and, although entirely out of the way, very convenient for manipulation.

The lathe is provided with power cross feed, as well as longitudinal feed and screw-cutting apparatus, and may be equipped with taper attachment if desired, and hence can perform on chuck or face plate work all the functions usually done with the regular engine lathe, with the advantage of greatly increased production within the same period of time.

The taper attachment is designed with a view to strength and substantiality, and is attached to the rear of the carriage. Tapers up to 4° to the foot.

It is to be carefully understood, however, in describing the 18" engine lathe with turret on carriage, and in quoting on same, it only applies to this distinct type as shown in cut and not the complete engine lathe with tail stock, compound rest, etc.

NOTE.—We furnish this modern lathe, either with friction-geared head, as shown in cut, or without the friction-geared head. Special circular of the latter furnished on application.

PRINCIPAL DIMENSIONS, ENGINE LATHE PROPER.

Plain Head.	Size of friction pulleys on countershaft, 12" x 4" for 3½" belt.
Front bearing, 2½" diameter x 4½" long.	Countershaft should run 130 revolutions per minute.
Back bearing, 2¼" diameter x 3½" long.	Swing over bed, 18¼"; over carriage, 12".
Diameter of hole through spindle, 1½".	Length between centers on 6" bed, 2' 8".
Cone diameter (five steps), 4½", 6¾", 8¼", 10½", 12".	
Width of belt, 2½".	Friction Head.
Ratio of back gearing, 12 to 1.	3½" diameter x 5¼" long.
Diameter of tail stock spindle, 2" movement, 2".	2½" diameter x 4" long.
Cuts screws from 1 to 20 per inch, including 11½ for pipe thread.	1½" diameter.
Feeds per inch, 5 to 105.	(Four steps), 4½", 6¾", 9¼", 11½".

DIMENSIONS OF TURRET AND SLIDE.

Width of turret, 10½" Holes in turret, 2" regular. Front slide, 10" wide, 16" long.

SHIPPING WEIGHTS, ETC.

Net weight of 6" bed, 2,400 lbs. Shipping weight (boxed, foreign), 2,700 lbs.
Dimensions for foreign shipment: 85" x 33" x 32" = 32 cubic feet.

18" ENGINE LATHE WITH TURRET ON BED.

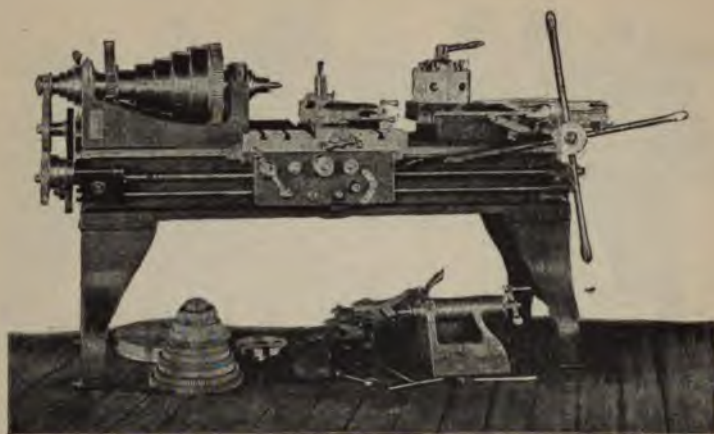


FIG. 11083.

DESCRIPTION FIG. 11083.

Demand for rapid lathe work, together with the increasing knowledge regarding the value of the turret lathe, has led to the adoption of the turret on the regular engine lathe in place of the usual foot block or tail stock. Where desired, the tail stock is also furnished, so that a complete engine lathe is at hand, by removing the turret.

The combination of a turret with the usual engine lathe offers advantages possessed by no other arrangement, if its use was contemplated in the original design and not an after consideration, so frequently the case. With this in view, the wearing surfaces for taking the thrust on live spindle are of unusual proportions—more than equal to the requirements imposed on them when constantly used for chucking purposes.

Inasmuch as perfect alignment of turret is of vital importance, ample provision is made to accurately compensate for all wear tending to destroy it.

These turrets are made either to revolve automatically or by hand, and with or without power feed.

The parts necessary to automatically revolve turret are made of tool steel, with all surfaces subject to abrasion hardened.

The tool is carefully designed to meet the requirements for heavy surface, and, though very solid and rigid, the convenience of the operator has been carefully looked after.

The feed for turret is driven independently from carriage feeds, so that both may operate on a piece of work with feeds best adapted to the requirements. The motion for turret feed is received from largest step of feed cone on end of spindle to a pulley driving a covered nest of cone gears. This arrangement permits of three changes of feed for turret, without changing the belt.

It will be noticed that five combinations are furnished on our engine turret lathes:

- First.—Plain turret, for hand revolving and hand feed.
- Second.—Plain turret and power feed.
- Third.—Automatic revolving turret and hand feed.
- Fourth.—Automatic revolving turret and power feed, and
- Fifth.—The regular engine lathe when tail stock is ordered.

PRINCIPAL DIMENSIONS OF THE 18" ENGINE LATHE.

Front bearing, 2 $\frac{1}{2}$ " diameter by 4 $\frac{1}{2}$ " long.

Back gearing, 2 $\frac{1}{4}$ " diameter by 3 $\frac{1}{4}$ " long.

Diameter of hole through spindle, 1 $\frac{1}{8}$ ".

Cone diameter (five steps), 4 $\frac{1}{2}$ ", 6 $\frac{1}{2}$ ", 8 $\frac{1}{4}$ ", 10 $\frac{1}{4}$ ", 12" long.

Width of belt, 2 $\frac{1}{2}$ ".

Ratio of back gearing, 12 to 1.

Diameter of tail stock spindle, 2". Movement, 5".

Cut screws from 1 to 20 per inch, including 11 $\frac{1}{2}$ for pipe thread.

Feeds per inch, 5 to 105.

Size of friction pulleys on countershaft, 12" x 4" for 3 $\frac{1}{2}$ " belt.

Countershaft should run 130 revolutions per minute.

Swing over bed, 18 $\frac{1}{4}$ "; over carriage, 12".

Length between centers on 6" bed, 2' 8".

18" ENGINE LATHE WITH TURRET ON BED.

DESCRIPTION FIG. 11083.—Continued.

DIMENSIONS AND CAPACITY OF THE TURRET ATTACHMENT.

Diameter of turret, 9". Length of slide, 30".
Length of shoe, 21". Movement of slide, 10".

Size of hole in turret, $1\frac{1}{4}$ ". Number of holes, 6.
Distance between head center and turret on 6' bed, 24".

SHIPPING WEIGHTS, ETC.

Net weight of engine turret lathe, 6' bed, 2,750 lbs.

Shipping weight (boxed, foreign), 3,150 lbs.

Dimensions for foreign shipment: $85'' \times 36'' \times 56'' = 99$ cubic feet.

24" TURRET HEAD BORING LATHE WITH GEARED FRICTION HEAD.

THE FAIRBANKS COMPANY



FIG. 11084.

DESCRIPTION FIG. 11084.

Spindle has 2" hole through its entire length. Front bearing, $4'' \times 6''$, rear bearing, $3'' \times 4\frac{1}{4}''$. Cone belt, 3". Turret has six holes, $1\frac{1}{4}''$ diameter. Slide is 38" long by 14" wide and has a travel of 30".

Lathe is furnished with 18" four-jaw chuck, friction countershaft, having pulleys $12'' \times 4\frac{1}{2}''$ which should run 140 and 160 revolutions per minute, and weighs complete, 3,000 lbs.

DESCRIPTION FIG. 11085.

Necessity for the economical production of large work in the same manner which has characterized such marked results in the production of small work, has resulted in our placing on the market a line of turrets in connection with our standard 24" engine lathes.

Although these turrets are of massive proportions, and possess rigidity to an unusual degree, they are conveniently handled, an important factor toward the end sought.

The turret slide is supplied with variable power feed and automatic stop, which in no manner interferes with the usual engine lathe feeds and screw-cutting mechanism, each being entirely independent of the other, and can be used separately, or collectively as the work demands. Therefore, should conditions exist where the same lathe is to be used for turning work between centers as well as when held in chuck or face plate, the tail stock can be furnished with which the turret interchanges, and either a regular complete engine lathe is at hand or a modern turret lathe.

The turrets are all furnished with power feed, but are made to revolve automatically or by hand to suit the user.

The details are constructed with great care, the diameter and made of tool steel. The locking plunger is also made of tool steel slides between large bearings, all made to take up wear.

24" ENGINE LATHE WITH TURRET ON BED.

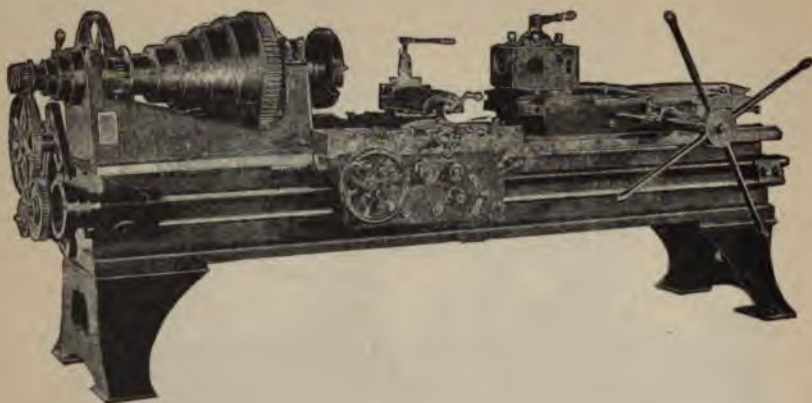


FIG. 11085.

DESCRIPTION FIG. 11085.—Continued.

All the parts pertaining to the automatic revolving mechanism of turret are also made of tool steel and hardened. Feeds are engaged and disengaged by levers conveniently placed in front of the pilot wheel. A careful comparison of the dimensions given herewith will demonstrate that the proportions of the turret are equal to the best practice.

PRINCIPAL DIMENSIONS 24" STANDARD ENGINE LATHE.

Front bearing, 4" diameter x 7" long.	Cuts screws from 1 to 16 per inch, including 11½ for pipe thread.
Back bearing, 3¼" diameter x 4½" long.	Feeds per inch, 4 to 65.
Diameter of hole through spindle, 2½"	Size of friction pulleys on countershaft, 16" x 5½" for 5" belt.
Cone diameter (five steps) 6", 8½", 11", 13½", 16".	Countershaft should run 90 revolutions per minute.
Width of belt, 3½"	Swing over bed, 24½"; over carriage, 16"
Ratio of back gearing, 12 to 1.	Length between centers on 10" bed, 5'
Diameter of tail-stock spindle, 2½". Movement, 9".	

PRINCIPAL DIMENSIONS OF TURRET.

Form of turret is hexagonal.	Length of bottom slide, 30".
Width over flats, 12½".	Width of bottom slide, 15".
Diameter of holes, 2½"	Extreme distance between spindle and turret face with 10" bed, 42"
Length of top slide, 46"	Weight of turret, 1,200 lbs.
Width of bearing surface, 17"	

SHIPPING WEIGHT, ETC.

Net weight 10' bed, 6,200 lbs. Shipping weight (boxed, foreign), 7,300 lbs.

Dimensions for foreign shipment 11' 1" x 3' 10" x 3' 6"—143 cubic feet.

HOLLOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.

The hollow hexagon turret lathes embody in their design many improvements and new features which are necessary for the rapid and accurate production of duplicate parts. These characteristic features apply to all four sizes.

HEAD AND BED.

To secure the greatest strength and rigidity, the head and lower half of gear guards are cast solid with the bed. The bed is supported on three points, thus insuring perfect alignment although the machine may be placed on an irregular foundation.

AUTOMATIC CHUCK.

The automatic chuck is operated by a long lever in front of the head. The head for holding the automatic chuck jaws is forged on the spindle, bringing the chuck close up to the front bearing, with a minimum of overhang. The jaws are hardened and ground and adjustable from actual size to $\frac{1}{16}$ " smaller. They are firmly held in position and do not drop to interfere with the introduction of a new bar of stock.

POWER ROLLER FEED.

The power roller feed is engaged and disengaged by the same lever which actuates the automatic chuck. A single adjustment suffices for both feed rolls and guide fingers when changing from one size or shape of stock to another, and the relation between the fingers and feed rolls is such that when the rolls are adjusted to give the requisite pressure for feeding the bar, the fingers are in proper position.

TURRET.

The turret is hexagon in form, of large diameter across faces, and has a broad bearing on the saddle. It is kept central by, and revolves upon, a large taper bearing which gives ample provision for taking up wear. The trussed form of the turret provides an exceptionally rigid support for the working tools, which are attached to the faces of the turret from the inside by two bolts. This is easily accomplished as the inner faces are parallel with the outer, which leaves the outer surface entirely available for the tool mechanism. The index is nearly the full diameter of the turret and the lock bolt is placed directly under the working tool. The feed is by rack and pinion. The feed rack is attached to the bed midway between the Vs, and is placed as high as possible, thus obviating all side strain which is found in most lathes. For extra heavy cuts the turret can be readily clamped to the saddle by means of a lever, and when forming and for similar work, the saddle can be clamped to the bed. The backward movement of the saddle gives the turret its partial revolution, which begins as soon as the working tool is free from the stock. The adjustable dog which is clamped to the feed rack governs the position of the saddle at the time when the turret begins to revolve. The geared automatic feed has four changes and is reversible for back turning. A screw-cutting feed is regularly provided for the No. 4 machine, and furnished for the No. 3 upon special order. The No. 4 machine also has power quick traverse, for the rapid handling of the turret, and for indexing.

HOLLOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.—Continued.

INDEPENDENT ADJUSTABLE STOPS.

These stops operate automatically for each face of the turret. They are placed in front of the saddle where they are protected from chips and dirt and they are easy of access for changing and adjusting. Supplementary stops are also provided for use when two or more stops are needed, for squaring shoulders to gauge, and similar work. Either of these stops automatically trips the turret feed.

TURRET SADDLE.

The saddle is gibbed to the outer edges of the bed by flat gibs throughout its entire length. The Vs are extremely large and there are no ledges along the ways on which chips can accumulate. Shields carried by the saddle cover that portion of the rack, also the Vs nearest the working tool, so that chips and oil are shed directly into the pan.

CARRIAGE.

The carriage of the Nos. 3 or 4 machines has geared automatic feed, both longitudinal and cross; each with four changes in either direction. There are two stops for the longitudinal travel, and the cross-feed screw is fitted with a graduated dial. A taper attachment is furnished when specially ordered.

GEARED FEEDS.

The automatic feeds are gear driven, insuring positive feed, and any one of the changes is instantly obtainable. The trips operate in connection with the independent adjustable stops, for each face of the turret. The turret and carriage feeds (Nos. 3 and 4 machines) are independent of each other.

TOOLS.

The tools included in the standard equipment furnished with the hollow hexagon turret lathes cover a great range of work. The universal turners are equipped with roller back rests which reduce the friction to a minimum, and permit running the stock at much higher speeds than is possible with a stationary rest, thus facilitating the use of the "high-speed" steels. The tool post, which swings about a stud, can be easily and accurately adjusted to the proper position by means of a screw, while an eccentric lever provides means of quickly withdrawing the tool from the work. These turners can be used for either forward or back turning. The slide tool, for cutting off and facing, is made especially strong and heavy, and has tools front and rear. It is so arranged that it may be used for forming. The automatic opening die is of approved design, tested by years of service under all conditions. The pointing tool is furnished for pointing or beveling the ends of bars. The tool holders are adapted for holding drills, reamers, etc.

STOCK STOP.

In an intermediate position between the cutting-off tool and the first turning tool is a stop for gauging the length of the stock. It is on the corner of the turret, which indexes automatically at this point, or not, as may be desired.

OIL PUMP.

Each machine is equipped with a geared oil pump which works automatically when the machine runs in either direction.

COUNTERSHAFT

A triple friction countershaft is furnished with these machines.

MOTOR DRIVE.

These machines can be arranged for motor drive.

HOLLOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.—Continued.

NO. 1 LATHE.

The No. 1 hollow hexagon turret lathe is furnished with friction back gears; automatic chuck; power roller feed; geared automatic feed for turret; independent adjustable stops for turret; stock stop; oil pump; outer stock support; tool stand and triple friction countershaft.



FIG. 11086.

STANDARD EQUIPMENT.

Automatic chuck jaws of the following sizes, adjustable for any diameter from actual size to $\frac{1}{16}$ " smaller:

Round, $\frac{3}{8}$ " to $1\frac{1}{4}$ ", by 8ths.

Square and hexagon, $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ " and $1\frac{1}{16}$ "; also $1\frac{1}{4}$ " hexagon.

Three universal turners, with roller back rest; adjustable from $1\frac{1}{2}$ " to $\frac{3}{8}$ ". (These tools are adapted for turning both forward and backward.)

One pointing tool.

One 1" automatic opening die with chasers for cutting United States standard threads as follows:

$\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{8}$ " and 1".

One slide tool for cutting off, facing, and forming.

Two tool holders.

SUPPLEMENTARY EQUIPMENT.

$1\frac{1}{16}$ " automatic opening die (with set of chasers for one thread).

9" three-jaw geared scroll chuck, for holding forgings and castings.

Drill chuck, capacity 0 to 1".

HOLLOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.—Continued.

SPECIFICATIONS OF NO. 1 LATHE.

Capacity of automatic chuck, round.....	1½"
Capacity of automatic chuck, square.....	1½"
Capacity of automatic chuck, hexagon.....	1¼"
Travel of turret saddle.....	18"
Turret feeds—revolutions of spindle to feed 1".....	28-46-78-140
Diameter of turret, across faces.....	9¼"
Swing over bed.....	14"
Largest diameter of cone.....	11"
Width of belt on cone.....	3"
Pulleys on countershaft.....	10"
Width of belt on countershaft.....	3½"
Countershaft speeds of—two pulleys forward.....	178 and 225
Give spindle speeds of—twelve changes.....	28 to 400
Floor space of machine.....	2' 6" x 8' 6"
Weight, net.....	2,350 lbs.
Weight, crated.....	2,750 lbs.
Weight, boxed for export.....	3,100 lbs.
Cubic measurement, boxed.....	107 cubic feet

NO. 2 LATHE.

The No. 2 hollow hexagon turret lathe is furnished with triple back gears; automatic chuck; power roller feed; geared automatic feed for turret; independent adjustable stops for turret; stock stop; oil pump; outer stock support; tool stand and triple friction countershaft.

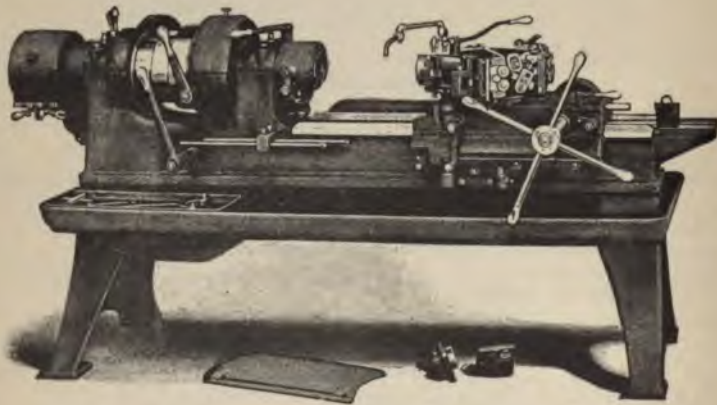


FIG. 11087.

HOLLOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.—Continued.

STANDARD EQUIPMENT

Automatic chuck jaws of the following sizes, adjustable for any diameter from actual size to $\frac{1}{16}$ " smaller:

Round, $\frac{3}{4}$ " to $2\frac{1}{4}$ ", by 8ths.

Square and hexagon, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", and $1\frac{5}{8}$ "; also 2" hexagon

Three universal turners with roller back rest; adjustable from $2\frac{1}{4}$ " to $\frac{1}{2}$ " (These tools are adapted for turning both forward and backward.)

One pointing tool.

One $1\frac{1}{4}$ " automatic opening die with chasers for cutting United States standard threads as follows:

$\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", 1", $1\frac{1}{8}$ " and $1\frac{1}{4}$ "

One slide tool for cutting off, facing and forming.

Two tool holders.

SUPPLEMENTARY EQUIPMENT

2" automatic opening die (with set of chasers for one thread).

Taper turner—as regularly furnished turns tapers up to $\frac{3}{4}$ " to the foot, 12" long.

$10\frac{1}{2}$ " three-jaw geared scroll chuck, for holding forgings and castings.

Drill chuck, capacity 0 to 1"

SPECIFICATIONS OF NO. 2 LATHE

Capacity of automatic chuck, round.....	2 $\frac{1}{4}$ "
Capacity of automatic chuck, square.....	1 $\frac{5}{8}$ "
Capacity of automatic chuck, hexagon.....	2"
Travel of turret saddle.....	24"
Turret feeds—revolutions of spindle to feed 1".....	25-42-70-125
Diameter of turret, across faces.....	12 $\frac{1}{4}$ "
Swing over bed.....	16"
Largest diameter of cone.....	13"
Width of belt on cone.....	3"
Pulleys on countershaft.....	12"
Width of belt on countershaft.....	4"
Countershaft speeds of—two pulleys forward.....	100 and 250
Give spindle speeds of—eighteen changes.....	15 to 330
Floor space of machine.....	2' 10" x 9' 2"
Weight, net.....	3,650 lbs.
Weight, crated.....	4,000 lbs.
Weight, boxed for export.....	4,900 lbs.
Cubic measurement, boxed.....	168 cubic feet

LOW HEXAGON TURRET LATHES.

DESCRIPTION FIGS. 11086 TO 11088.—Continued.

NO. 3 LATHE.

No. 3 hollow hexagon turret lathe is furnished with geared head and friction back gears; automatic chuck; power roller feed; automatic feed for turret; independent adjustable stops for turret; geared automatic longitudinal and cross feeds for carriage; oil pump; outer stock support; tool stand and triple friction countershaft.

Automatic chuck jaws of the following sizes, adjustable for any diameter from actual size to $\frac{1}{16}$ " smaller:

Round, $1\frac{1}{4}$ " to $3\frac{1}{4}$ ", by 8ths.

Square and hexagon, $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ " and 2"; also $2\frac{1}{2}$ " and $2\frac{3}{4}$ " hexagon.

Four universal turners with roller back rest; adjustable from 3" to $\frac{3}{4}$ ". (These tools are adapted for turning both forward and backward.)

One pointing tool.

One automatic opening die with chasers for cutting 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ " and 2" United States standard threads.

Two tool holders.

No. 3 machine with standard equipment as above described.

Roller feed attachment for turret.

Taper attachment for carriage.

With both screw-cutting feed and taper attachment.

NO. 4 LATHE.

No. 4 hollow hexagon turret lathe with geared head and friction back gears; automatic chuck; power roller feed; geared automatic feed; screw-cutting feed for leading-on dies and power quick traverse for turret; independent adjustable stops for turret; geared automatic longitudinal and cross feeds for carriage; oil pump; outer stock support; tool stand and triple friction countershaft.

Automatic chuck jaws of the following sizes, adjustable for any diameter from actual size to $\frac{1}{16}$ " smaller:

Round, $2\frac{1}{2}$ " to $4\frac{1}{4}$ ", by 8ths.

Square and hexagon, 2", $2\frac{3}{4}$ " and $2\frac{1}{2}$ "; also $3\frac{1}{4}$ " and $3\frac{1}{2}$ " hexagon.

Four universal turners, adjustable from 4" to $1\frac{1}{4}$ ". (These tools are adapted for turning both forward and backward.)

One pointing tool.

One 2" automatic opening die with chasers for cutting 2", $2\frac{1}{2}$ " and 3" United States standard threads.

Two tool holders.

No. 4 machine with standard equipment as above described.

With taper attachment for carriage.

HOLLOW HEXAGON TURRET LATHES.

NO. 4 LATHE, MOTOR DRIVEN.

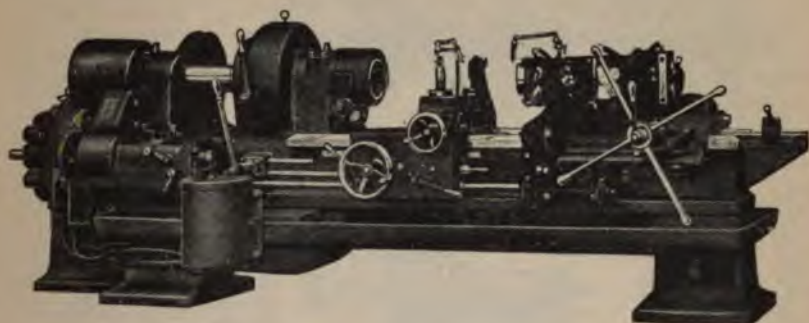


FIG. 11086.

For general description see preceding pages.

SPECIFICATIONS OF NO. 3 AND NO. 4 LATHES.

	No. 3.	No. 4.
Capacity of automatic chuck, round.....	3½"	4½"
Capacity of automatic chuck, square.....	2"	2½"
Capacity of automatic chuck, hexagon.....	2¾"	3½"
Travel of turret saddle.....	36"	36"
*Turret feeds.....	25-42-70-126	20-33-55-100
†Screw-cutting feeds.....	3 to 16	2 to 12
Diameter of turret, across faces.....	15"	18"
Travel of carriage, longitudinal.....	30"	30"
Travel of carriage, cross.....	7½"	10"
*Carriage feeds, longitudinal.....	25-42-70-126	24-40-66-120
*Carriage feeds, cross.....	118-196-326-586	62-103-172-312
Swing over bed.....	20½"	24"
Largest diameter of cone.....	15"	18"
Width of belt on cone.....	4"	4"
Pulleys on countershaft.....	16"	18"
Width of belt on countershaft.....	4½"	5"
Countershaft speeds of—two pulleys forward.....	220 and 280	315 and 200
Give spindle speeds of—twelve changes.....	18 to 237	18 to 190
Floor space of machine.....	11' x 3' 6"	12' 4" x 4'
Weight, net.....	7,000 lbs.	10,000 lbs.
Weight, crated.....	7,750 lbs.	11,500 lbs.
Weight, boxed for export.....	* 500 lbs.	13,000 lbs.
Cubic measurement, boxed.....	½ cubic feet	250 cubic feet

* Feeds are in terms of revolutions of spindle to feed 1".

at order only.

NO. 2 SETOVER AND BRASS FINISHER'S LATHE.

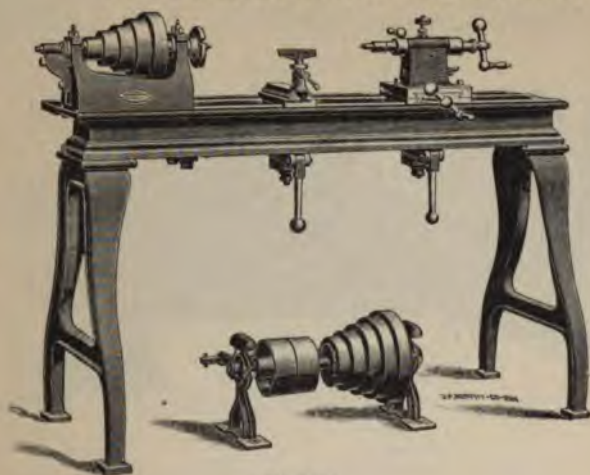


FIG. 11089.

DESCRIPTION FIG. 11089.

No. 2 lathe, bed 5' long; swings 13"; with dovetail setover and back motion and overhead works. Cone for 2" belt has five changes; countershaft with 8" by 2 $\frac{1}{4}$ " light and loose pulleys should make 250 revolutions per minute. Floor space 65" by 24". Shipping weight 600 lbs.

Can be furnished with dovetail setover, with back motion, or with plain tail stock, as desired.

NO. 1 SQUARE ARBOR LATHE.

FOR BRASS FINISHERS.

DESCRIPTION FIG. 11090.

No. 1 square arbor lathe, bed 6' long; swings 15"; with dovetail setover, swivel and back motion, back gears, screw apparatus and overhead works. Cones have four changes for 2 $\frac{1}{4}$ " belt. 1 $\frac{1}{2}$ " countershaft has 10" reverse pulleys, or 10" by 3" friction pulleys, and should make 180 revolutions per minute. Floor space 82" by 28". Weight, 1,000 lbs.



FIG. 11090.

NO. 2 SQUARE ARBOR LATHE.
FOR BRASS FINISHERS.

DESCRIPTION FIG. 11091.
No. 2 square arbor lathe, bed 3' long; swings 13"; with screw apparatus and hardened spindle, dovetail setover, back motion and overhead works. Cones have four changes for 2" belt, 1½" countershaft has 8" by 2½" reverse pulleys and should make 250 revolutions per minute. Floor space 74" by 26". Shipping weight 675 lbs.

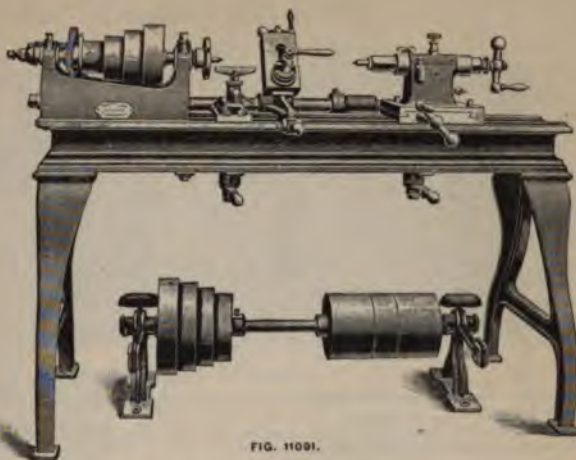


FIG. 11091.

15" SQUARE ARBOR FOX LATHE.

DESCRIPTION FIG. 11092.
This lathe swings 15" and has 5' bed. It is furnished with set of hob and leader to cut any one thread. Unless otherwise specified in order will furnish to cut 11¼ threads per inch.

Hole through spindle, ½".
Countershaft pulleys, 10" diameter.
Weight, 1,275 lbs.
Taper attachment is included.



FIG. 11092.

BOX BODY CHUCKS.
FOR BRASS LATHES.

DESCRIPTION FIG. 11093.
Made in 9", 12", 14" and 16" sizes.
Each chuck is provided with one set of blank slip jaws. Any number of sets of these jaws can be furnished, customer arranging them to hold any special shapes.

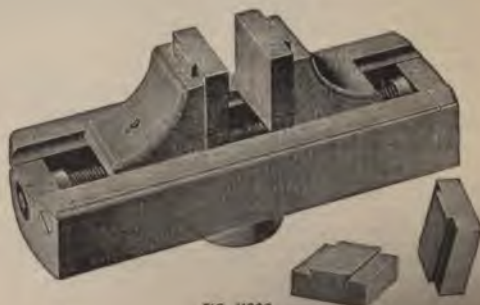


FIG. 11093.

UNIVERSAL MONITOR LATHES.

13" LATHE. WITH PLAIN HEAD.



FIG. 11094.

16" LATHE. WITH FRICTION HEAD.



FIG. 11095.

DESCRIPTION FIGS. 11094 AND 11095.

These machines have been lately redesigned and the modern practice of increasing the driving power, rigidity and weight has been closely followed.

The bed is specially heavy and rigid, the head end is supported by a cabinet provided with tool shelves and the tail-end leg is attached in a hinged manner to form a three-point support.

The head stock is cast in one piece with the bed. The spindle bearings are of genuine babbit, but also phosphor bronze journals can be supplied.

The friction clutches for the back gears are of a well approved and simple design, positive in action and easily adjustable.

The spindle is of special high carbon crucible steel, all the bearings are ground and provisions made for easy oiling and taking up wear. A wire feed or automatic chuck can be applied to the spindle.

The turret revolves on a stem with adjustment for wear and the locking bolt withdraws at the return movement of the top slide, making it semi-automatic. The index ring is of hammered steel and hardened.

The turret slides have substantial bearings, and the swivel is graduated and has an accessible and firm clamping device. The cross slide is extra long, it does not leave its bearings and so protects them from chips and dirt. The cross screw is graduated.

The chasing bar is very substantial but easy to handle. The gearing is arranged to cut right- and left-hand threads without changing the leader. The follower holder is yielding for taper work and leaders and followers for 11½, 14 and 18 threads go with each machine.

A double friction countershaft, specially designed and adapted for the severest duty, accompanies each machine.

SPECIFICATIONS.

	Size of Machine.		
	13" Plain.	16" Plain.	16" Frict. B. G.
Swing.....	13½"	16¼"	16¼"
Length of bed.....	4' 2"	5' 4"	5' 4"
Largest diameter of cone.....	9"	11"	11"
		4 steps	
Width of belt.....	3"	3½"	3"
Diameter of nose of spindle.....	2"	2½"	2½"
Number of threads per inch.....	8	8	8
Diameter of hole in spindle.....	1½"	1½"	1½"
Diameter of turret.....	6½"	8"	8"
Diameter of holes in turret.....	1"	1¼"	1¼"
Distance from center of hole to slide.....	15½"	2"	2"
Length that can be milled.....	5"	6"	6"
Cross movement.....	5"	6"	6"
Swing over chasing slide.....	5¼"	5½"	5½"
Greatest distance between turret and spindle.....	19"	24"	24"
Diameter of friction pulleys on countershaft.....	10"	12"	12"
Width of belt.....	3½"	4"	4"
Revolutions of countershaft, about.....	300	300	375
Foundation space.....	25" x 54"	24" x 67"	24" x 67"
Floor space, about.....	30" x 60"	36" x 80"	36" x 80"
Weight, complete, net, about.....	1,030	1,575	1,675
Weight, complete, crated, about.....	1,070	1,675	1,775
Weight, complete, boxed, about.....	1,300	2,000	2,100
Cubic feet.....	23	50	50

16" UNIVERSAL MONITOR LATHE.

DESCRIPTION FIGS. 11096 AND 11097.

Lathe is furnished with plain back geared head as shown in Fig. 11096 or with friction head as shown in Fig. 11097.

Each machine is provided with chasing bar and set of hob and leader for cutting one standard thread, taper attachment, countershaft and wrenches.



FIG. 11096.



FIG. 11097.

SPECIFICATIONS

FIGS. 11096 AND 11097.

Swing.....	16"
Length of bed.....	5'
Hole in spindle.....	1 1/4"
Countershaft pulleys.....	10"
Weight.....	1,400 lbs.

No. 2 IMPROVED TURRET LATHE.

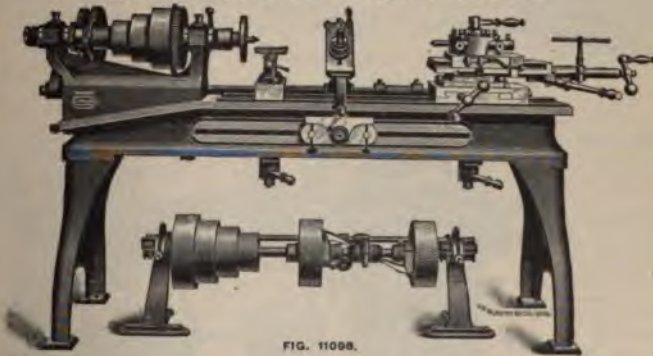


FIG. 11098.

DESCRIPTION FIG. 11098.

Bed 6' long; swings, 18 1/2"; hollow spindle with 1 1/4" hole; back gears, screw apparatus, taper attachment and overhead works. Cone for 2 1/4" belt has four changes. Countershaft with 10" by 3" friction pulleys should make 180 revolutions per minute. Floor space 106" by 30". Shipping weight 1,500 lbs.

CABINET TURRET LATHES.

DESCRIPTION FIGS. 11099 AND 11100.

The cabinet turret lathe, for the use of workers in brass and iron, is excessively compact and firm, and is, therefore, not liable to spring and chatter.

Skillful workmen recognize the difficulty, if not the impossibility, of doing accurate work on the common lathe, if its centers are not in line, or do not "agree," as the term runs. This difficulty is much magnified in the ordinary turret machine as all tools are rigidly held in the turret sockets so that should the alignment not be accurate the tools will cut larger than their own measurements and the machine is unreliable.

This alignment is always perfect in a new machine, but by constant use the turret head or tail stock wears in the V's, so that after a while its center becomes lower than that of the head center.

To offset this condition the bed of this lathe is provided with an apron piece having a vertical tongue planed at right angles to the V's, and which engages with a corresponding slot in an apron on the cabinet and can be adjusted by a screw underneath and fastened by four stud bolts after position is attained; the other end of bed can be similarly raised at leg end and a perfect level maintained.

The head stock of this lathe is made to swivel on the top plane of the cabinet so that tapering holes can be bored by swivelling the head. Ironworkers will readily see the advantage of this method of boring tapering holes as the power feed can be used and no swivelling of tail stock becomes necessary.

The bearings both of spindle and boxes are of steel, hardened and ground, and are conical in shape so that accurate adjustment is assured.

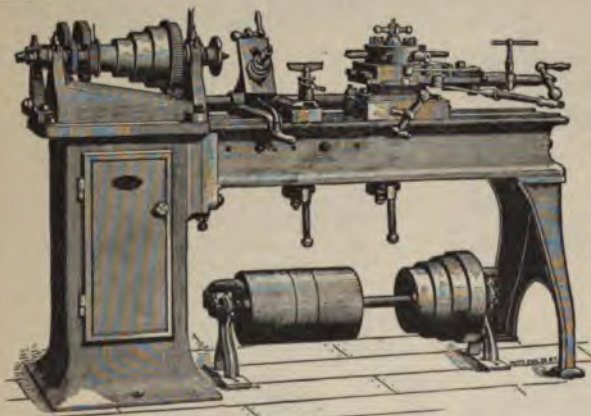


FIG. 11099. NO. 2 LATHE.

No. 1 CABINET TURRET LATHE.

SPECIFICATIONS.

Bed 7' long; swings 20°; engine feed, back gears, screw apparatus, taper attachment and overhead works. Cone for 2 3/4" belt has four changes. Countershaft with 12" reverse pulleys should make 160 revolutions per minute. Floor space 112" by 60". Shipping weight 2,950 lbs.

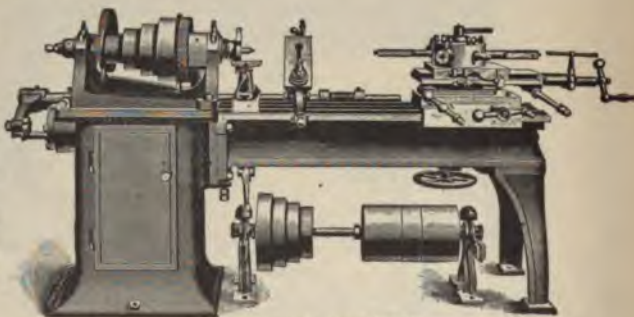


FIG. 11100. NO. 1 LATHE.

No. 2 CABINET TURRET LATHE.

SPECIFICATIONS.

Bed 6' long; swings 18 1/2°; back geared, screw apparatus, taper attachment and overhead works. Cone for 2 3/4" belt has four changes. Countershaft with 10" reverse pulleys should make 180 revolutions per minute. Floor space 100" by 42". Shipping weight 2,000 lbs.

20" FULL UNIVERSAL MONITOR LATHE.

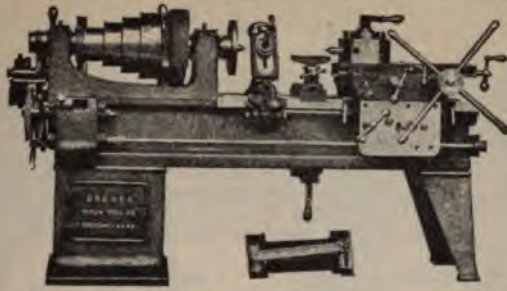


FIG. 1101.

DESCRIPTION FIG. 1101.

This machine is designed for general brass and similar work of special and heavy character, and with the object to manufacture without special tools in a more economical way than is possible with an ordinary universal monitor lathe.

The turret carriage is provided with an automatic feed placed as in a regular engine lathe, in an apron at the front of the machine. The four coarsest feeds are 8, 11½, 14 and 18 per inch conforming with the standard pipe threads. This arrangement not only avoids stripping of threads in large tapping, but also, inside and outside, straight and taper threads can be cut by a turret tool without a tap or die. There are twelve changes of geared feed, eight being multiples by 3 and 6 respectively of the four coarsest. Four changes of feed can be made instantly by the handle located below the head stock. The reverse is made by a knob in front of the apron.

The turret carrying slide is provided with a pilot wheel for rapid movement and a screw for finer adjustment.

A set over and taper attachment is provided for the turret. The taper attachment is shown below the bed and can be used in connection with the power feed for taper turning, boring and threading. It slides between the V's of the bed and can be clamped in any position and removed when not used. Screw clamping stops are provided for setting the turret holes exactly in line with the spindle.

The turret revolves on a stem with adjustment for wear and the locking pin withdraws at the return movement of the top slide, making it semi-automatic.

The machine has also the well-known chasing bar and the follower holder is yielding for taper work. Right and left hand threads can be cut without changing the leader.

The head stock is friction back geared and a wire feed or automatic chuck can be applied to the spindle.

The cabinet support under the head is provided with tool shelves, and the tail end leg is attached in a hinged manner to form a three point support.

SPECIFICATIONS

Swings over V's.....	20½"
Length of bed.....	6' 6"
Largest diameter of cone.....	12"
Width of belt.....	3"
Diameter of nose of spindle.....	3"
Number of threads per inch.....	6
Diameter of hole in spindle.....	1½"
Diameter of turret.....	9½"
Diameter of holes in turret.....	1½"
Distance from center of hole to slide.....	2¼"
Length that can be milled.....	10"
Cross movement.....	9"
Swings over chasing slide.....	6¼"
Greatest distance between turret and spindle.....	29"
Diameter of friction pulleys on countershaft.....	14"
Width of belt.....	4"
Revolutions of countershaft, about.....	350
Foundation space.....	27" x 78"
Floor space, about.....	52" x 98"
Weight, net, about.....	2,900
Weight, crated, about.....	3,100
Weight, boxed, about.....	3,400
Cubic feet.....	72

NO. 00 TURRET LATHE.

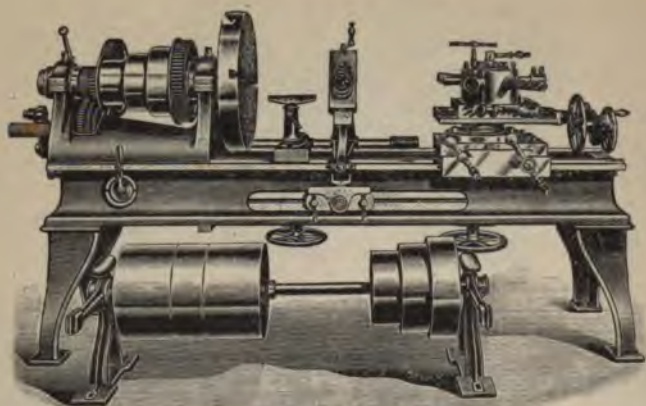


FIG. 11102.

DESCRIPTION FIG. 11102.

No. 00 turret lathe, 8' bed; swings 20°; with engine feed, back gears, screw apparatus, overhead works and taper-attachment.

Cone for 4" belt, with three changes.

Countershaft with 14" reverse pulleys, should make 150 revolutions per minute.

Floor space 126" by 64".

Shipping weight 3,150 lbs.

This lathe is designed particularly for large and severe work.

The special features in its construction are the hollow spindle with hole for 2½" stock; the large face plate 24" in diameter; the head stock is of new design and all working parts are covered and free from liability of contact with the belt. The boxes are of bronze, the front bearing being 4½" in diameter, 6" long, and the rear bearing 3½" in diameter, 5½" long.

The turret has six holes 1¾" in diameter and is provided with two square hole chucks, one round hole chuck, two boring bars and one center. The turret slide is operated by a hand wheel, combined with certain gear changes which enable the operator, by simply moving a lever, to have either a quick or slow movement of the turret, the slow movement being geared so that much greater power is obtained for operating it by hand. The tail stock is operated by power feed and has two changes. The cross slide is operated by hand and travels 7½".

This lathe is very effective either on iron or brass work, and where a large tool is required we feel sure that this one will be satisfactory.

AUTOMATIC TURRET LATHES.

FOR BRASS AND IRON WORK.



FIG. 11103.

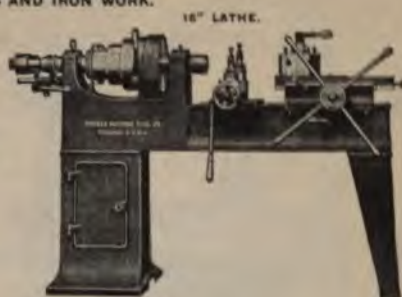


FIG. 11104.

DESCRIPTION FIGS. 11103 AND 11104.

The bed is of the box pattern with a dovetail top, which provides the best means for keeping alignment and for quick and firm gripping of the turret and cut-off rest. It is supported on the three point principle to avoid springing and getting out of alignment. The top is provided with holes for the oil and chips to drop through.

The head stock on the smaller machines is cast in one piece with the bed. The housings are provided for either phosphor bronze or Babbitt metal bearings.

The friction clutch back gear is of a new design, very simple in operation and positive in action. The wear is taken up by a screw-driver from the outside, without even removing the cover.

The spindle is of special hammered crucible steel. The bearings are ground and run in phosphor bronze boxes with special means for oiling and taking up the wear.

The turret revolves automatically on a ground steel stem with special device for taking up the wear. The index ring and key are of hardened steel and ground, the square locking bolt is provided with an adjustable taper gib.

The cutting-off rest is provided with an independent stop for the front and rear tool. The 13" machine has lever feed only. The 16", screw and lever feed combined, and the 18", screw feed only.

A double friction countershaft and all necessary wrenches are furnished with each machine. These machines can be furnished with friction back gears, wire and power feed, chasing bar, automatic chuck, pump and pan, set-over turret, forming rest and longitudinal movement to the cutting-off rest.

SPECIFICATIONS.

	Size of Machine				
	13" Plan.	15" Plan.	16" Front. B. G.	18" Plan.	18" Front. B. G.
Swing.....	13½"	15½"	16½"	18½"	18½"
Length of bed.....	4' 2"	5' 4"	5' 4"	6' 6"	6' 6"
Largest diameter of cone.....	9"	11"	11"	13"	13½"
Number of steps.....	3	4	3	3	3
Width of belt.....	3"	3½"	2½"	4"	4½"
Diameter of nose of spindle.....	2"	2½"	2½"	3½"	3½"
Number of threads per inch.....	8	8	8	8	8
Diameter of hole in spindle.....	1½"	1¾"	1¾"	2½"	2½"
Diameter of turret.....	6½"	8"	8"	9½"	9½"
Diameter of hole in turret.....	1"	1½"	1½"	1½"	1½"
Distance from center of hole to slide.....	2"	2½"	2½"	3½"	3½"
Length that can be milled.....	5"	7"	7"	12"	12"
Centric distance between turret and spindle.....	20"	24"	24"	31"	27"
Diameter of friction pulleys on countershaft.....	10"	12"	12"	14"	14"
Width of belt.....	3½"	4"	4"	4½"	4½"
Revolutions of countershaft for iron and steel, about.....	250	200	250	120	160
Revolutions of countershaft for brass, about.....	300	300	215	180	240
Foundation space.....	23" x 54"	24" x 60"	24" x 60"	24" x 64"	24" x 64"
Floor space, about.....	30" x 60"	32" x 73"	32" x 73"	36" x 96"	36" x 96"
Weight, complete, net, about.....	800	1,400	1,500	1,600	2,300
Weight, complete, crated, about.....	1,000	1,470	1,600	1,900	2,800
Weight, complete, boxed, about.....	1,100	1,600	1,800	2,200	2,600
Cubic feet.....	23	48	58	68	88

TURRET LATHE ATTACHMENTS.

CUTTING-OFF REST.

WITH WHEEL AND LEVER FEED COMBINED, AS FURNISHED WITH 15" TURRET LATHES.

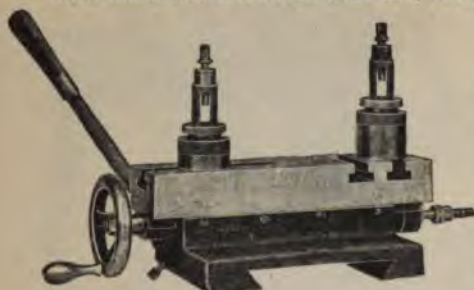


FIG. 11105.

DESCRIPTION FIGS. 11105 TO 11113.

These attachments are designed for use with turret lathes shown in figs. 11094, 11095, 11103, 11104.

They are not furnished as part of the regular equipment of the machines, but can be supplied at extra cost when the lathe is purchased or at any time thereafter, if desired.

CUTTING-OFF REST. WITH LEVER FEED ONLY, AS FURNISHED WITH 13" TURRET LATHES.



FIG. 11106.

SLIDE REST. FOR 13" AND 16" TURRET AND MONITOR LATHES.



FIG. 11107.

DESCRIPTION FIG. 11107.

This rest can be set and fed at any angle. It has a longitudinal feed of $7\frac{1}{2}$ " and a cross feed of 3".

The screws are well protected from chips.

VERTICAL FORMING REST. AS FURNISHED WITH 13" AND 16" TURRET LATHES.

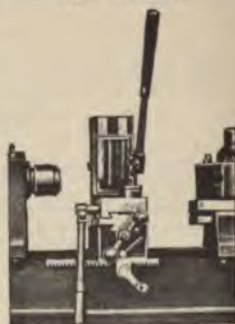


FIG. 11108.

ROUGHING BOX TOOL.



2

FIG. 11109.

SOLID TAP AND DIE HOLDER.



3

FIG. 11110.

TURRET LATHE ATTACHMENTS.

FINISHING BOX TOOL.



4
FIG. 1111.

FINISHING BOX TOOL.



5
FIG. 1112.

CLUTCH TAP AND DIE HOLDER.



6
FIG. 1113.

(For description see preceding page.)

SPINNING LATHES.

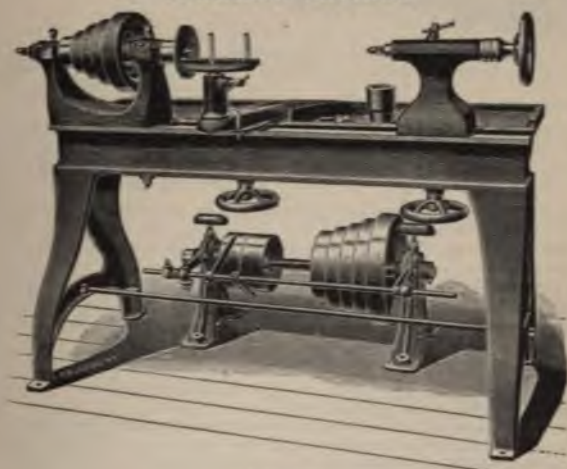


FIG. 1114.

DESCRIPTION FIG. 1114.

This lathe is built in a thoroughly mechanical manner of the best materials and is guaranteed to be first class in every particular. The spindle is of steel, running in long bearings lined with genuine Rabbit metal and fitted with adjusting screws, thus insuring perfect adjustment at all times.

The wire pulleys are made of either iron or wood, wood being preferable on account of its lightness and gripping qualities.

Each lathe is furnished with one spinning rest, one wood turning rest, one rest bank, one nipple and screw, one hollow chuck, one screw face plate, two centers, a rest tray and a complete countershaft with self-oiling hangers.

The lathe is built in the following sizes:

Exhibited Bearings	
12" swing, 4' bed.	18" swing, 5' bed.
15" swing, 5' bed.	21" swing, 5' bed.

24" swing, 5' bed.

Extra long beds made to order.

DOUBLE HEAD AXLE LATHE.



FIG. 11115.

DESCRIPTION FIG. 11115.

This lathe, which is of new design, is very powerful and rigid. In place of the usual driving cone, it has a constant speed pulley. The cutting speeds, of which there are three, are obtained by gearing through a speed variator. The gears, which are steel, are entirely encased and run in oil insuring perfect lubrication to the bearings. The changing of speed is accomplished by shifting levers, conveniently located on the case.

The power is transmitted from the speed variator to the driving head by a 2 $\frac{1}{2}$ " shaft placed within the frame.

All driving shafts are of high carbon steel and run in brass boxes, scraped to fit.

There are four instantaneous changes of feed, ranging from $\frac{1}{16}$ " to $\frac{1}{8}$ " to one turn of the axle, obtained through a feed box. The gears, which are of steel, run in oil and are operated by a lever placed in the center of the lathe.

The driving head is of powerful construction, the power being applied to the heavy driving gear, between two brass-lined bearings, 5" long and 13" in diameter. The driving head has an opening, 10" in diameter, through which the axle is passed, and is furnished with double self-centering steel driver. The axle, revolving on dead centers, is turned and finished complete at both ends without reversing, thereby insuring the utmost accuracy as well as speed.

The tail stocks have a bearing of 20° on the bed, and are clamped in position by four heavy bolts and binders. The spindle in the left hand tail stock is clamped rigidly, while that of the right hand tail stock is adjustable by means of a screw and handwheel, and is clamped by a split binder. The tail stock spindles are 3 $\frac{1}{16}$ " diameter.

There are two independent carriages, right and left, driven by a splined feed shaft, through rack and pinion, all gearing being enclosed. The carriages have a bearing on the Va, of 30°, scraped to fit. They also have a bearing on the back of the bed which takes up the forward thrust, thus overcoming the tendency to raise them from the Va, when burnisher is used.

The rack is of steel, 1 $\frac{1}{2}$ " wide, 6 pitch.

The feed shaft is 1 $\frac{1}{2}$ " diameter.

The bed is 23" wide and 15 $\frac{1}{2}$ " deep. It is very rigid, being strongly enforced by cross ties of box pattern.

Distance between centers, 7' 8"

The swing over the ways is 19 $\frac{1}{2}$ " and over the carriage, 5"

The centers are of tool steel, 1 $\frac{3}{8}$ " diameter.

The driving pulley is 22" diameter, for 6" belt.

The countershaft carries a pulley corresponding to the driving pulley on the lathe, and also tight and loose pulleys 18" diameter, for 7" belt. The loose pulley is brass lined, and the hangers are self-oiling.

Weight of lathe is 9,000 lbs. net.

Weight of crane attachment, 800 lbs. extra.

Weight of water attachment, 700 lbs. extra.

Note: This lathe is also built in the single end type. Single end lathe can be furnished with either one or two carriages, as may be desired. Complete specifications sent on application.

SPINDLE AND AXLE BORING LATHE.

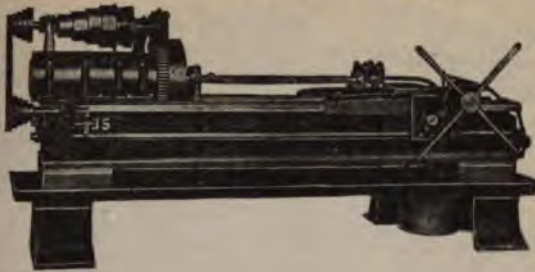


FIG. 11116.

DESCRIPTION FIG. 11116.

This machine has been designed in two sizes and to bore holes on No. 1 machine from $\frac{3}{4}$ " to 4" in diameter through bars, spindles or axles from $1\frac{1}{2}$ " to 7" in diameter and any length up to 60"; and on No. 2 machine to bore holes $\frac{3}{4}$ " to 6" through similar stock from $1\frac{1}{2}$ " to 11" in diameter and any length up to 84".

The head stock is made with long bearings for the spindle, and its center is raised only sufficient over the top surface of the bed to permit of swinging the chuck.

The spindle is a large cast-iron shell with a three-jaw universal scroll chuck substantially secured to a flange cast integral with the spindle.

It revolves in bearings lined with babbit metal which has been peneled, bored and scraped to fit, after being cast in place.

The bar to be bored is securely held in the chuck, and passing through the spindle is supported at the other end by adjustable screws furnished for the purpose.

The driving cone is mounted on an auxiliary shaft placed above the spindle, to which it is connected by means of a pinion which engages with gear cut into rear flange of chuck.

Back gears are provided, which in connection with two speeds obtained from the countershaft, give sixteen boring speeds arranged in geometrical progression.

A long carriage which supports the drill and boring tool slides on large V's, and is gibbed its full length to outside of bed.

Instead of using one rack and pinion for moving carriage on the bed, two racks are provided, one on each side of the top of bed, into which pinions mesh, which are cut out of the solid into pilot wheel shaft.

Inasmuch as one-half of the force required to feed the drill against its cut is transmitted by each pinion, the carriage is much more steadily fed than it would be if only one rack and pinion at one side of the bed were used.

The carriage may be rapidly moved in any position with the pilot wheel, and the power feed is engaged with a powerful friction in the usual manner.

A very important requisite of a boring machine is a wide range of feeds of ample power.

With a five-step cone on the driving shaft, which revolves 3 to 1 of spindle, motion is transmitted to a feed cone geared to feed rod in such a manner that two speeds may be obtained from each cone step, thus giving ten rates of feeds in proper proportion to each other, from .0005" to .01" per revolution.

A guide for centering the boring tools is furnished, which is only used for starting the hole, after which it may be swung out of use.

A force pump is supplied to keep the cutting edge of drill lubricated and to wash out the chips as fast as they are made.

A neat pan surrounds the machine with a reservoir of ample capacity for oil, so that the lubricant has sufficient time to cool before being used again.

The advantages due to arranging a boring machine with a large hollow spindle, capable of receiving the largest bars to be bored, are as follows:

A comparatively short bed is required for boring long holes, resulting in a compact, rigid machine, and as the pieces being bored is securely gripped in the chuck and supported at the other end by the means provided, no extra rest (as, for instance, steady rests) are needed.

SPECIFICATIONS.

	No. 1, 7" x 60"	No. 2, 11" x 84"
Diameter of head cone.....	10", 8 $\frac{1}{2}$ ", 7", 5 $\frac{1}{2}$ "	10", 8 $\frac{1}{2}$ ", 7", 5 $\frac{1}{2}$ "
Width of bed.....	3'	3'
Back gear ratio.....	5 to 1	5 to 1
Hole in spindle.....	7 $\frac{1}{2}$ "	11 $\frac{1}{4}$ "
Length of spindle, including chuck.....	37 $\frac{1}{2}$ "	37 $\frac{1}{2}$ "
Length of hole which may be bored in one setting.....	60"	84"
Travel of carriage.....	60"	84"
Range of feeds.....	.0005" to .01"	.0005" to .01"
Countershaft pulleys.....	12" x 4"	12" x 4"
Revolutions per minute.....	225 and 265	225 and 265
Weight.....	6,000 lbs.	7,000 lbs.

PULLEY TURNING LATHES.

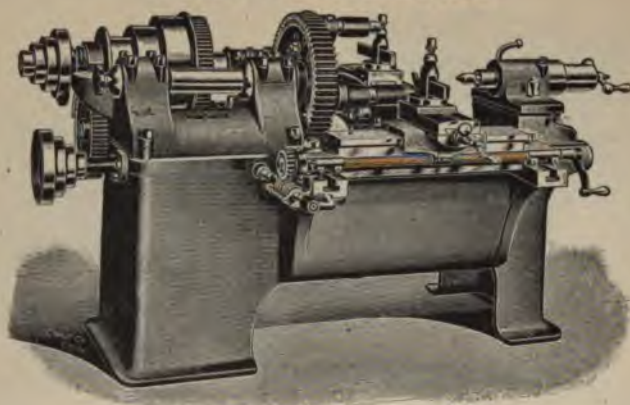


FIG. 11117. SHOWS 26" LATHE.

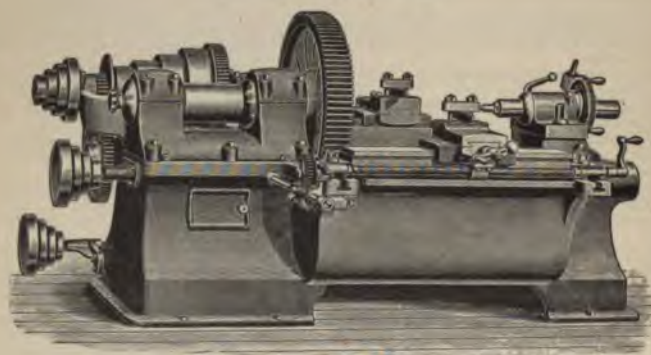


FIG. 11118. SHOWS 50" LATHE WITH BORING ATTACHMENT

DESCRIPTION FIGS. 11117 AND 11118.

Each lathe is furnished with countershaft and wrenches.

G geared feed, boring attachment, compound rest, and oval crowning attachment can be furnished at extra cost if desired.

SPECIFICATIONS.

	26"	36"	50"	60"
Weight, complete, ready for shipment	2,000 lbs.	3,800 lbs.	4,500 lbs.	.....
Floor space required	$5\frac{1}{2}' \times 4\frac{1}{4}'$	$7' \times 5\frac{1}{2}'$	$7\frac{3}{4}' \times 7'$	$8\frac{1}{2}' \times 8\frac{1}{4}'$
Diameter of face plate	16"	24"	30"	38\frac{1}{2}"
Speed of countershaft, R. P. M.	180	180	100	180
Size of pulleys on countershaft	$12" \times 3"$	$14" \times 4"$	$14" \times 5"$	$10" \times 5"$
Number of changes of speed	6	8	6	9
Diameter of cones	$11\frac{1}{2}"$, 9", $6\frac{1}{2}" \times 3"$	$14\frac{1}{4}"$, $11\frac{1}{2}"$, $9\frac{1}{2}"$, $6\frac{1}{2}" \times 3\frac{1}{2}"$	14", $11\frac{1}{2}"$, $9\frac{1}{2}" \times 5\frac{1}{2}"$	16", $14\frac{1}{2}"$, $12\frac{1}{2}" \times 5"$
Diameter and face that can be turned	$5"$ to $26" \times 20"$	$10"$ to $36" \times 24"$	$10"$ to $50" \times 30"$	$10"$ to $60" \times 32"$
Distance between centers	34"	24"	34"	36"

SPECIAL PATTERN 26" PULLEY LATHE.

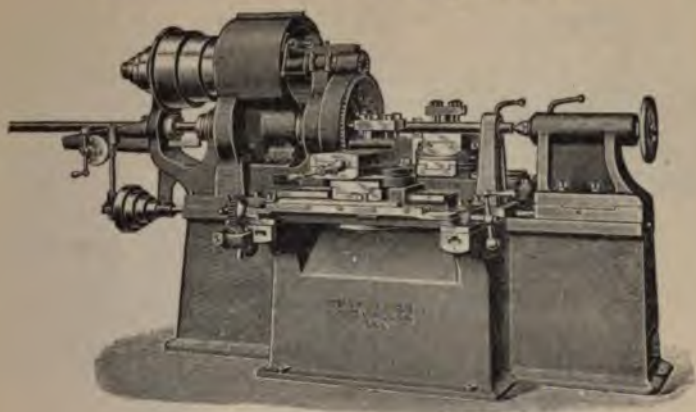


FIG. 11119.

DESCRIPTION FIG. 11119.

Arranged with boring attachment, compound rests, and oval crowning attachment.

This lathe is designed to operate on a wider range of work than the regular 26" pattern shown on preceding page, for rapid finishing of pulleys, gear blanks and similar work.

It is rigidly constructed, powerfully geared, and is adapted to show good results with modern high speed steel from the smallest diameters, up to its full swing.

The cut shows the boring attachment as applied to this lathe. It allows the use of any length of bar which can be gripped at any point, giving the cutter unlimited length of feed. Work may be held for boring by a chuck or by special devices and driving for turning by plain drivers or by special holder if work is done in large quantities.

When required, we supply these lathes with compound rests and oval crowning attachment.

PRINCIPAL DIMENSIONS.

Ratio of gearing, 15 to 1 and 45 to 1.

Hole in spindle, $1\frac{3}{8}$ " diameter.

Diameter and face that can be turned 2" to 26" diameter, 20" face.

Distance between centers, 24".

Countershaft speed, 190 and 400 revolutions per minute.

Size of pulleys on countershaft 14" diameter, 5" face.

Size of cone pulley, 14", $11\frac{1}{4}$ " and $9\frac{1}{2}$ " for 4" belt.

Turning feeds, 4, 8, 16 and 32 per inch.

Width of belt for feed cones, $1\frac{1}{4}$ ".

Boring feeds, 16, 32, 64 and 128 per inch.

Floor space, 8' long, 7' wide.

Floor space with boring attachment, 10' long, 7' wide.

Shipping weight, 5,000 lbs.

BALL MACHINE.

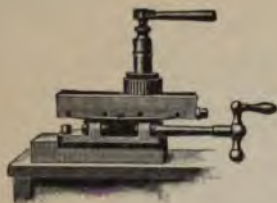


FIG. 11120.

DESCRIPTION FIG. 11120.

This device is for the formation of perfect spheres and if set with the cutting tool exactly in the center will produce accurate work. These machines are made in two sizes, one for balls up to 5" and the other up to 8".

No. 0 machine, turns up to 8".

No. 1 machine, turns up to 5".

CRANK PIN MACHINE.

DESCRIPTION FIG. 11121.

These crank pin turning machines are designed to true up crank pins on engines. They are light in weight, but at the same time they are quite strong and durable. Will feed either way and do the turning quickly and accurately.

The end of the machine next to the driver contains a four-jawed independent chuck for setting the machine and holding it while being clamped to driver. In the out end of the machine there is an adjustable center that projects and fits the original center of the pin, placing that end of the machine true to the original center; by this center and the chuck jaws the machine can be set up to the original centers. The machine is secured by clamping, with bolts passing through the spokes of the driver. When the pins have a collar, the jaw chucks being thin, can remain on it but where there is no collar these jaws should be drawn up out of the way of the turning tool. The annular cutter head containing the turning tool is driven by a shaft and pinion; this shaft gearing operates two feed screws automatically; this feeding mechanism can be thrown out, or will feed by hand while finishing up the ends of the pin. It is made in five sizes, No. 1 to go over 6½" collars; No. 2 to go over 8½" collars. No. 1 and 2 are mostly used on locomotives, but can be used on any overhanging cranks.

The larger sizes are for larger engines as used in rolling and steel mills, etc.

No. 3 takes in diameter of pins from 8" to 12".

No. 4 takes in diameter of pins from 12" to 16".

No. 5 takes in diameter of pins from 16" to 20".

When ordering give diameter and length of pins, also whether outside collar is loose or solid; if loose give diameter of clamping bolt and number of threads.

No. 1.	To go over 6½" collars.....	weight, 253 lbs.
No. 2.	To go over 8½" collars.....	weight, 300 lbs.
No. 3.	To go over 12" collars.....	weight, 700 lbs.
No. 4.	To go over 16" collars.....	weight, 950 lbs.
No. 5.	To go over 20" collars.....	weight, 1,400 lbs.

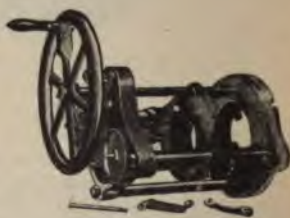


FIG. 11121.

ECCENTRIC MANDREL TURNING MACHINE.

TAKES ALL SIZES FROM 6" TO 9½" DIAMETER OF AXLE.



FIG. 11122.

DESCRIPTION FIG. 11122.

This mandrel is designed for quickly turning up locomotive eccentrics and other similar work. It consists of a face plate to bolt against the face plate of the lathe. In the face plate of the machine is a slot machined out central; in this slot is carried the mandrel carrying the expanding chucks, and is set out of center to the amount of the throw by the adjusting screw. There are three hubs varying in size, that carry four taper expanders; two sets of them are furnished with each machine, and fit any one of the hubs. These expanders are set out equally by the nut and washer shown at the end of the screw. On the extreme out end is an attachment for supporting the outer end and taking up all vibration. This part has an adjustable hardened steel center that is set to suit the dead center of the lathe after the adjustment for the throw has been made.

This is a very complete tool, and can be made to take all sizes and all throws (with a recording adjustment).

INDEPENDENT LATHE CHUCKS.

"1904 PATTERN."



FIG. 11123.

HEAVY PATTERN.



FIG. 11124.

Jaws have a full threaded nut.

SPECIFICATIONS FIG. 11123.

No.	Rated Size of Chuck *	Diam. of Center Hole.	Diam. of Bases for Face Plate.	Approx. Shipping Weight. Lbs.
904	4½"	1"	4"	10
906	6"	1½"	5"	17
908	8"	1¾"	5"	34
909	9"	1¾"	5"	41
910	10"	2"	6"	49
912	12"	2¼"	6½"	80
914	14"	3"	7¾"	105
915	15"	3"	8"	122
916	16"	3"	8½"	133
918	18"	4"	10"	175
920	20"	4"	11"	195
921	21"	4"	11"	215
922	22"	5"	12"	238
924	24"	5"	13"	270
926	26"	5"	14"	300
928	28"	5"	15"	340
930	30"	5"	15"	422
936	36"	6"	18"	550

* Diameter of

SPECIFICATIONS FIG. 11124.

No.	Rated Size of Chuck.	Diameter of Chuck Body.	Diameter of Hole through Center.	Diameter of Bases for Face Plate.
006	6"	8"	1¾"	3½"
008	8"	9½"	1¾"	4"
010	10"	11"	2"	4¾"
012	12"	13"	3"	6½"
014	14"	14½"	3"	7"
016	16"	16½"	3"	7¾"
	18"	18"	3"	8"
	20"	20"	3"	10"
	22"	22"	3"	12"
	24"	24"	3"	12"
	26"	26"	3½"	13"
	28"	28"	3½"	14"

BALL MACHINE.

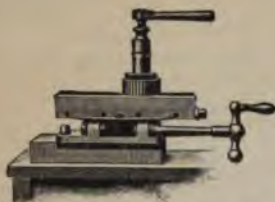


FIG. 11120.

DESCRIPTION FIG. 11120.

This device is for the formation of perfect spheres and if set with the cutting tool exactly in the center will produce accurate work. These machines are made in two sizes, one for balls up to 5" and the other up to 8".

No. 0 machine, turns up to 8".

No. 1 machine, turns up to 5".

CRANK PIN MACHINE.

DESCRIPTION FIG. 11121.

These crank pin turning machines are designed to true up crank pins on engines. They are light in weight, but at the same time they are quite strong and durable. Will feed either way and do the turning quickly and accurately.

The end of the machine next to the driver contains a four-jawed independent chuck for setting the machine and holding it while being clamped to driver. In the out end of the machine there is an adjustable center that projects and fits the original center of the pin, placing that end of the machine true to the original center; by this center and the chuck jaws the machine can be set up to the original centers. The machine is secured by clamping, with bolts passing through the spokes of the driver. When the pins have a collar, the jaw chucks being thin, can remain on it but where there is no collar these jaws should be drawn up out of the way of the turning tool. The annular cutter head containing the turning tool is driven by a shaft and pinion; this shaft gearing operates two feed screws automatically; this feeding mechanism can be thrown out, or will feed by hand while finishing up the ends of the pin. It is made in five sizes, No. 1 to go over 6½" collars; No. 2 to go over 8½" collars. No. 1 and 2 are mostly used on locomotives, but can be used on any overhanging cranks.

The larger sizes are for larger engines as used in rolling and steel mills, etc.

No. 3 takes in diameter of pins from 8" to 12".

No. 4 takes in diameter of pins from 12" to 16".

No. 5 takes in diameter of pins from 16" to 20".

When ordering give diameter and length of pins, also whether outside collar is loose or solid; if loose give diameter of clamping bolt and number of threads.

No. 1. To go over 6½" collars.....	weight, 253 lbs.
No. 2. To go over 8½" collars.....	weight, 300 lbs.
No. 3. To go over 12" collars.....	weight, 700 lbs.
No. 4. To go over 16" collars.....	weight, 950 lbs.
No. 5. To go over 20" collars.....	weight, 1,400 lbs.



FIG. 11121.

ECCENTRIC MANDREL TURNING MACHINE.

TAKES ALL SIZES FROM 6" TO 9 1/2" DIAMETER OF AXLE.



FIG. 11122.

DESCRIPTION FIG. 11122.

This mandrel is designed for quickly turning up locomotive eccentrics and other similar work. It consists of a face plate to bolt against the face plate of the lathe. In the face plate of the machine is a slot machined out central; in this slot is carried the mandrel carrying the expanding chucks, and is set out of center to the amount of the throw by the adjusting screw. There are three hubs varying in size, that carry four taper expanders; two sets of them are furnished with each machine, and fit any one of the hubs. These expanders are set out equally by the nut and washer shown at the end of the screw. On the extreme out end is an attachment for supporting the outer end and taking up all vibration. This part has an adjustable hardened steel center that is set to the draw center of the lathe after the adjustment for the throw has been made.

This is a very complete tool, and can be made to take all sizes and all throws (with a recording adjustment).

INDEPENDENT LATHE CHUCKS.

"1904 PATTERN."



FIG. 11123.

HEAVY PATTERN.



FIG. 11124.

SPECIFICATIONS FIG. 11123.

No.	Rated Size of Chuck, ϕ	Diam. of Center Hole.	Diam. of Bore for Face Plate.	Approx. Shipping Weight, Lbs.
904	4 1/2"	1"	4"	10
906	6"	1 1/2"	5"	17
908	8"	1 3/4"	5"	34
909	9"	1 3/4"	5"	41
910	10"	2"	6"	49
912	12"	2 1/4"	6 3/4"	80
914	14"	3"	7 1/4"	105
915	15"	3"	8"	122
916	16"	3"	8 1/2"	133
918	18"	4"	10"	175
920	20"	4"	11"	195
921	21"	4"	11"	215
922	22"	5"	12"	226
924	24"	5"	13"	270
926	26"	5"	14"	300
928	28"	5"	15"	340
930	30"	5"	15"	425
936	30"	6"	18"	560

Jaws have a full threaded nut.

SPECIFICATIONS FIG. 11124.

No.	Rated Size of Chuck.	Diameter of Chuck Body.	Diameter of Hole through Center.	Diameter of Bore for Face Plate.
006	6"	8"	1 1/4"	3 1/4"
008	8"	9 1/2"	1 3/8"	4"
010	10"	11"	2"	4 3/4"
012	12"	13"	3"	6 1/4"
014	14"	14 1/4"	3"	7"
016	16"	16 1/2"	3"	7 3/4"
018	18"	18"	3"	8"
020	20"	20"	3"	10"
022	22"	22"	3"	12"
024	24"	24"	3"	12"
026	26"	26"	3 1/2"	13"
028	28"	28"	3 1/2"	14"

* Diameter of body is same as rated size.

INDEPENDENT LATHE CHUCKS.

SPECIFICATIONS FIG. 11125.



FIG. 11125.

Size.	Diameter.	Weight, lbs.	Diameter of Bore through Center.	Diameter of Bore on Face Plate.	Capacity of Chuck.
4.....	4½"	6	1"	39"	4½"
5.....	5½"	10	1½"	35"	5½"
6.....	6½"	14	2"	31"	6½"
8.....	8½"	30	2½"	27"	8½"
9.....	9½"	34	2½"	25"	9½"
10.....	10"	44	2½"	23"	10½"
12.....	12½"	70	3"	19"	12½"
14.....	14½"	80	3"	17"	14½"
15.....	15½"	85	3"	17"	15½"
16.....	16½"	95	3"	17"	16½"
18.....	18½"	115	4"	8"	19"
20.....	20½"	162	4"	10"	21"
21.....	21"	180	4"	10"	21"
22.....	22½"	200	4½"	10"	23"
24.....	24½"	217	4½"	10"	25"
26.....	26½"	292	5"	12"	27"
28.....	28½"	350	5½"	12"	29"
30.....	29½"	424	5½"	16½"	31"
32.....	32"	500	5½"	16½"	33"
34.....	34"	570	5½"	17½"	35"
36.....	36"	552	5½"	17½"	36½"
38.....	38"	650	6"	20"	40"
40.....	40"	750	6"	20"	42"
42.....	42"	1,082	6"	20"	43"
44.....	44"	1,200	6"	20"	46"
46.....	46"	1,400	6"	20"	48"
48.....	48"	1,500	6"	20"	50"

COMBINATION AND UNIVERSAL LATHE CHUCKS.

SPECIFICATIONS FIGS. 11126 AND 11127.

Size.	Will Hold.	Weight, lbs.
5.....	5½"	18
6.....	6½"	20
8.....	8½"	38
9.....	9½"	45
12.....	12½"	65
15.....	15½"	80
18.....	18½"	105
21.....	21½"	118
24.....	24½"	140
26.....	27"	252
30.....	31½"	300
36.....	37"	390



FIG. 11126. THREE-JAW CHUCK.



FIG. 11127. FOUR-JAW CHUCK.

The jaws of these chucks are reversible and can be adjusted to work either universally or independently.

SPUR GEARED SCROLL COMBINATION LATHE CHUCKS.

SPECIFICATIONS FIG. 11128.



FIG. 11128.

Diameter Over All.	Will Hold Inside of Jaws.	Diameter of Bore on Face Plate.	Diameter Over All.	Will Hold Inside of Jaws.	Diameter of Bore on Face Plate.
8"	8½"	3½"	21¼"	26"	9½"
10½"	12"	4½"	24"	30"	10"
13¼"	15"	5½"	27"	33"	12¾"
16"	18"	6½"	30"	36"	12¾"
18½"	21½"	7½"	36"	43"	15"

These chucks are made with either three or four jaws.

UNIVERSAL GEARED SCROLL CHUCKS. WITH THREE OR FOUR JAWS.



FIG. 11129.

THREE-JAW CHUCK.

Nominal Size.	Diameter of Hole.	Diameter of Recess for Flange.
2"	1 1/2"	1 1/2"
2 1/4"	1 3/4"	1 3/4"
3"	2"	2"
3 1/2"	2 1/4"	2 1/4"
4"	2 1/2"	2 1/2"
5"	2 3/4"	2 3/4"
6"	3"	3"
7 1/2"	3 1/4"	3 1/4"
9"	3 3/4"	3 3/4"
10 1/2"	4"	4"
12"	4 1/4"	4 1/4"
15"	4 3/4"	4 3/4"

DESCRIPTION FIGS. 11129 AND 11130.

Jaws are of the No. 1 style which are the kind mostly used for lathe work and will hold as large as the diameter of chuck body.

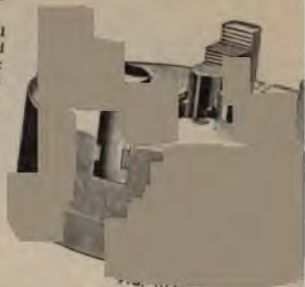
Three pinion gears in all except the 2".
Body recessed in back for flange plate.

Jaws are not reversible.
Steel key and screws for attaching to flange plate furnished with each chuck.

Made in sizes, as noted below.

Several other styles of jaw can be furnished for these chucks, and they are frequently furnished with two or more sets of jaws, thus making them exceedingly useful for several classes of work.

Full particulars will be furnished upon application.



FOUR-JAW CHUCK.

Nominal Size.	Diameter of Hole.	Diameter of Recess for Flange.
3"	5/8"	2 1/2"
4"	1"	3 1/2"
5"	1 1/4"	3 3/4"
6"	1 1/2"	4 1/4"
7 1/2"	2"	4 3/4"
9"	2 1/2"	5 1/4"
10 1/2"	3"	5 3/4"
12"	3 1/2"	7"
15"	4"	7"



NO. 48.

FACE-PLATE JAWS.

DESCRIPTION FIG. 11131.

The No. 48 face-plate jaws are strong and serviceable, capable of standing the heaviest strains.

They are furnished in sets of three or sets of four, in five different sizes, as follows:

6", 8", 10", 12" or 14".

EXTRA HEAVY FACE-PLATE JAWS.

DESCRIPTION FIG. 11132.

To meet the occasional demand for an extra heavy face-plate jaw we are placing on the market our No. 50 (see cut). These jaws are made very strong of the most approved design, and are calculated to meet the heaviest work that is demanded of chucks of this character. We furnish either in sets of three or four, and with solid jaws only.

- Sizes, 10", 12" and 18".
- Set of four 10" jaws weighs 450 lbs.
- Set of four 12" jaws weighs 550 lbs.
- Set of four 18" jaws weighs 700 lbs.



NO. 50.

FIG. 11132.

BANKS COMPANY

IMPROVED TURRET HEAD.



FIG. 11133.

CAN BE ATTACHED
TO ANY LATHE.

DESCRIPTION FIG. 11133.

Made in two sizes as follows:

No. 1 turret is made with a $1\frac{1}{8}$ " hole in the shank. This size hole is as a rule large enough to allow for split bushings to make the proper fit on the tail-stock spindle. We will make this turret to order with any size hole in the shank up to $1\frac{3}{8}$ " so you can fit it direct to your tail-stock spindle or the lathe center. The revolving part of the turret is drilled with six holes, any size you may order up to 1" for holding the cutting tools.

No. 2 turret is made with any size hole in the shank up to $1\frac{3}{4}$ ", or we will ream the shank hole taper to fit on the tail-stock center, same as a chuck is usually held on a speed lathe. The revolving part of the No. 2 turret is drilled with six holes, any size up to $\frac{3}{4}$ " for holding the cutting tools.

NO. 00 WIRE FEED SCREW MACHINE.

DESCRIPTION FIG. 11134.

This size will take stock up to $\frac{1}{4}$ " diameter, and is suitable for the smallest size of rod work. An endless variety of screws, studs and pins, such as used in watch cases, clocks, electric light fittings, etc., can be made from steel or brass on this machine. The lightness of the working parts gives the requisite sensitiveness for small tools, and the low height, combined with the small compass, make it a convenient tool for rapid work and large production.

Equipment: 1 B collet $\frac{1}{8}$ "; 2 tool posts, 2 collars and 2 blocks; 1 oil pot with swinging arm; 1 stock-feed collar; 2 wire guide bushings; 5 wrenches; 1 stop plug; 1 double friction countershaft.

For specifications, see following page.

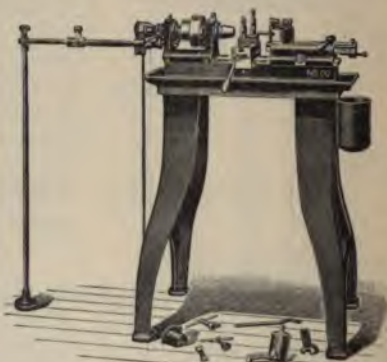


FIG. 11134.

NO. 1 AND NO. 11 WIRE FEED SCREW MACHINES.

DESCRIPTION FIG. 11135.

This size of screw machine is well adapted for making the common sizes of small screws, pins, knobs, etc., used on typewriters, sewing machines, small manufactured articles, etc.

The machine is built to stand continual rapid work, and has every desirable feature that experience and skill could suggest, and has thus far stood the severest tests without interruption of any kind. The movement and indexing of the turret is light and uniform, making the tool a large producer.

Equipment:

No. 1 screw machine, wire feed.—One-half B collet; 5 wrenches; 1 oil pot with swinging arm; 2 tool posts, 2 collars, 2 blocks; 1 stock feed collar; 6 stock guide bushings; 2 extra chain weights; 1 stop plug; 1 double friction countershaft.

No. 11 screw machine.—Three-quarter K collet; 2 tool posts, 2 collars and 2 blocks; 1 oil pot with swinging arm; 6 wire feed stock bushings; 1 stock collar; 5 wrenches; 1 stop plug; 1 double friction countershaft.

For specifications, see following page.

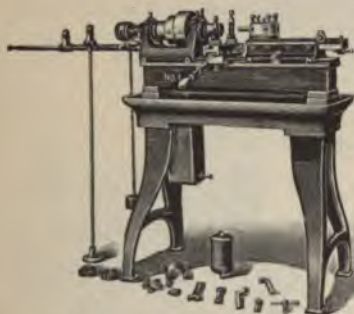


FIG. 11135 SHOWS NO. 1 MACHINE.

No. 11 screw machine is the No. 1 machine with increased spindle capacity.

No. 2 AND No. 12 WIRE FEED SCREW MACHINES.

DESCRIPTION FIG. 11136.

The Special Features of the Machine are:
 Large spindle.
 Large capacity for passing through stock.
 Minimum overhang to chuck.
 Head stock of great stiffness built up around cone in deep curved section.

Bronze cap boxes.
 Adjustment for wear and realigning under all conditions of wear.
 Wire feed colllets well proportioned and of ample length, and can be depended on to hold the stock.

Wire feed by lever and ratchet motion.
 Forward motion of lever opens chuck and feeds stock, and return stroke tightens chuck, spindle running.

Adjustable feeding collar for all sizes of stock.
 Cross slide has lever feed.

Cross slide stops of the protected solid plug variety; don't spring and are capable of fine adjustment.

Adjustment of height of cross slide tools by spiral collars and spiral wedges resting on same, which give a fine adjustment and remain where set.

Side binders for turret tools.
 Turret has taper sleeve adjustment for wear.
 Turret slide and base have large wearing surfaces, and design of locking mechanism is such as not to cause weakness underneath the turret where strength is most needed.

Lock pin and bushings of tool steel, hardened and ground.
 Shock of momentum in stopping rotation of turret taken on stop plug, and the lock pin and bushings relieved of this duty and their accuracy maintained.

Bed closed on top and bottom, making a box construction of utmost stiffness.

Bed sets on three points to prevent warping.
 Oil pan has large chip capacity and is provided with oil reservoir and double strainers, and can be connected with rotary pump and piping.



FIG. 11136.
 SHOWS NO. 2 MACHINE.

No. 12 machine is the No. 2 machine with increased spindle capacity. No. 12 machine has pilot wheel turret.

Equipment:
 No. 2 screw machine, wire feed.—Three-quarter K collet; 2 tool posts, 2 collars and 2 blocks; 1 oil pot with swinging arm; 6 stock-guide bushings; 2 stock-feed collars; 5 wrenches; 1 stop plug; 1 double-friction countershaft.

No. 12 screw machine.—One-inch K collet; 2 tool posts, 2 collars and 2 blocks; 1 oil pot with swinging arm; 5 wrenches; 6 stock-guide bushings; 1 stock feed collar; double-friction countershaft.

SPECIFICATIONS FIGS. 11134 TO 11136.

	No. 10.	No. 1.	No. 11.	No. 2.	No. 12.
Capacity of spindle with wire feed.....	1 1/2"	3 1/2"	1 1/2"	1 1/2"	1 1/2"
Capacity of spindle without wire feed.....	4 1/2"	8 1/2"	1 3/4"	1 3/4"	1 3/4"
Length that can be milled.....	2"	3"	3"	6"	6"
Swing over bed.....	6"	6"	6"	10 1/2"	10 1/2"
Diameter of holes in turret.....	3/8"	5/8"	3/8"	1 1/2"	1 1/2"
Number of holes in turret.....	6	6	6	6	6
Largest diameter of cone.....	4"	6"	6"	8 1/2"	8 1/2"
Width of belt required for plain cone.....	1 1/4"	2"	2"	2 1/2"	2 1/2"
Diameter of turret.....	2 1/2"	4 1/2"	4 1/2"	6 1/2"	6 1/2"
Center of holes to turret slide.....	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Length of bed.....	20 1/4"	32 1/4"	32 1/4"	45"	45 1/2"
Friction pulleys on countershaft.....	6" x 2"	8" x 3"	8" x 3"	10" x 3"	10" x 3"
Speed of countershaft, revolutions per minute.....	400	300	300	250	250
Floor space required.....	30" x 17"	42" x 22"	42" x 22"	60" x 26"	60" x 26"
Domestic shipment—crated (weight).....	240 lbs.	575 lbs.	700 lbs.	1,100 lbs.	1,170 lbs.

No. 2 AND No. 2 1/2 DOUBLE TURRET SCREW MACHINES.

DESCRIPTION FIG. 11137.

These machines are particularly adapted for work which must be operated on at both ends and be true and in line, such as the ball-bearing hubs and axles of automobiles, turn buckles, etc., and pieces having a long hole of small diameter, which it is difficult to drill true in a jig.

Any shape piece can be handled, and it is not at all necessary that the piece be round.

A great saving of time is effected by working from both ends in this manner, and it insures the ends of the piece running true with each other in the same concentric plane.



FIG. 11137.

SPECIFICATIONS.

	No. 2.	No. 2 1/2.
Regular chuck capacity, diameter.....	1 1/2"	2"
Utmost chuck capacity (special), diameter.....	2 1/2"	4"
Thickness of chuck.....	1 1/2"	2 1/2"
Length that can be milled.....	6"	8 1/2"
Maximum distance face of chuck to turret.....	6 1/2"	8"
Number of holes in turret.....	6	6
Diameter of turret.....	6 1/2"	7 1/2"
Diameter of holes in turret.....	1 1/2"	1 1/2"
Center of turret holes to slide.....	1 1/2"	2 1/2"
Friction pulleys on countershaft.....	10" x 3 1/2"	12" x 4"
Speed of countershaft, revolutions per minute.....	150	175
Floor space required.....	62" x 27"	80" x 30"
Domestic shipment—crated, weight.....	1,050 lbs.	1,600

WIRE FEED SCREW MACHINES.

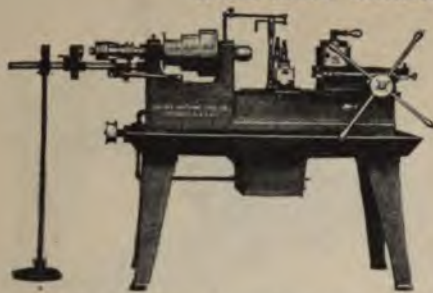


FIG. 11138. NO. 1 PLAIN HEAD MACHINE.

The turret revolves automatically on a ground steel stem with special device for taking up the wear.

The index ring and key are of hardened steel and ground. The square locking bolt is provided with an adjustable taper gib.

The power feed has three changes proportioned for the regular run of work. The larger machines have three independent stop screws revolving in a bracket at the tail end of the turret slide; they serve at the same time as positive and automatic stops for hand and power feed.

The cutting-off rest is extra heavy, and is provided with an independent stop for the front and rear tool. The No. 1 machine has lever feed only; the No. 1½, screw and lever feed combined, and the No. 2½, screw feed only.

The oil pump is very powerful; it works right and left, and by means of a relief valve any pressure can be obtained. A large oil reservoir is hinged to the oil pan, and can be tipped and cleaned in a few minutes.

The inside of the reservoir is divided in two chambers. The lubricant used on the machine flows through a strainer and funnel into the first chamber where all grit and dirt is settled; from here it overflows into the second chamber, out of which the pump takes a cleaned supply.

All details are specially strong to avoid breakage.

One collet, a double friction countershaft, two splash sheets and all necessary wrenches go with each machine.

DESCRIPTION FIGS. 11138 AND 11139.

The bed is of the box pattern which provides the best means for keeping alignment and for quick and firm gripping of the turret and cut-off rest. It rests on small legs in a large oil pan, and is supported on the three point principle to avoid springing and getting out of alignment. The top is provided with holes for the oil and chips to drop through.

The head stock on the smaller machines is cast in one piece with the bed. The housings are provided for either phosphor bronze or Babbitt metal bearings.

The friction clutch back gear is of a new design, very simple in operation and positive in action. The wear is taken up by a screw driver from the outside, without even removing the cover.

The spindle is of special hammered crucible steel. The bearings are ground and have special means for oiling and taking up the wear.

The wire feed advances the stock and grips it while the machine is running. The thimble and collets are of steel hardened and ground.

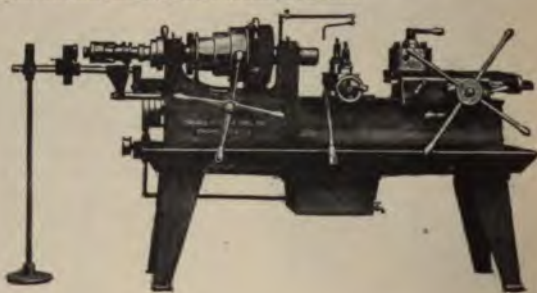


FIG. 11139. NO. 1½ FRICTION HEAD MACHINE.

SPECIFICATIONS.

	No. of Machine			
	1 Plain	1½ Plain	2 Frict. B. G.	2½ Frict. B. G.
Capacity through wire feed.....	1"	1½"	2"	2½"
Diameter of hole through spindle.....	13/16"	1½"	1½"	1½"
Swing over bed.....	13 1/2"	15 1/2"	15 1/2"	18 1/2"
Length of bed.....	4' 2"	5' 4"	5' 4"	6' 6"
Largest diameter of cone.....	9"	11"	11"	12 1/2"
Number of steps.....	3	4	3	3
Width of belt required.....	3"	3 1/2"	2 1/2"	3 1/2"
Diameter nose of spindle.....	2"	2 1/2"	2 1/2"	3 1/2"
Threads per inch.....	8	8	8	8
Diameter of turret.....	6 1/2"	8"	8"	9 1/2"
Diameter of holes in turret.....	1"	1 1/8"	1 1/8"	1 1/8"
Distance from center of holes to turret slide.....	2"	2 1/8"	2 1/8"	3 1/8"
Length that can be milled.....	5"	7"	7"	12"
Greatest distance between turret and spindle.....	20"	25"	21"	27"
Diameter of friction pulleys.....	10"	12"	12"	14"
Width of belt.....	3 1/2"	4"	4"	4 1/2"
Revolutions of countershaft.....	250	200	240	160
Foundation space.....	25" x 54"	25" x 72"	25" x 72"	27" x 64"
Floor space, about.....	81 1/2" x 3'	11' x 3 1/2'	11' x 3 1/2'	12' x 4'
Weight, complete, net, about.....	1,150 lbs.	1,675 lbs.	1,825 lbs.	2,800 lbs.
Weight, crated, about.....	1,225 lbs.	1,775 lbs.	1,925 lbs.	2,975 lbs.
Weight, boxed, about.....	1,450 lbs.	1,950 lbs.	2,175 lbs.	3,350 lbs.
Cubic feet of box.....	30	45	45	82

SCREW SLOTTING MACHINE.

DESCRIPTION FIG. 11140.

In the design and construction of this machine our aim has been to produce a simple and convenient tool which could be easily and rapidly operated and sold at a reasonable price.

The entire operation for gripping and slotting the screw is in a straight downward motion. The upward return motion releases the work and leaves the jaws ready for another piece.

One jaw being adjustable, screws from $\frac{1}{8}$ " to $\frac{1}{2}$ " diameter can be handled without trouble of changing any of the parts. The bearings of the machine are all adjustable, to compensate for wear, and convenient adjustments provide for position and depth of slot.

A cone pulley is provided on the spindle to better adapt it to a wider range between large and small screws and for steel and brass.

Aside from screw slotting, the machine may be applied to various forms of light milling where extra speed of handling is desired.

The clamping device for holding the screw can be swung to one side when down, for removing and inserting work, without danger of hitting the saw. It is also balanced by a spring which can be adjusted to any tension.

Equipment: 1 wrench; 1 plain countershaft.

SPECIFICATIONS.

Largest diameter of screw handled.....	5/8"
Width of spindle belt.....	2 3/4"
Tight and loose pulleys on countershaft.....	8" x 2 1/2"
Speed of countershaft, revolutions per minute.....	135
Floor space required.....	26" x 30"
Domestic shipment, crated, weight.....	365 lbs.
Foreign shipments, tight boxed (11 c. l.), weight.....	410 lbs.



FIG. 11140.

CENTRIFUGAL OIL SEPARATORS.

NO. 1 SEPARATOR.



FIG. 11141.

NO. 2 SEPARATOR.



FIG. 11142.

DESCRIPTION

The oil separator has been in use for many years, but never so especially designed to separate the oil from chips, turning screw or other machines where oil is a factor in their product.

The large amount of oil annually wasted is a strong argument in its favor, there being, of course, some waste, but small in

amount at the present time. These machines are used for all kinds of work that is made on machines where oil is used, and the oil can be separated and used again almost indefinitely.

CENTRIFUGAL OIL SEPARATORS.

DESCRIPTION FIGS. 11141 AND 11142.—Continued.

There can also be considerable oil saved by putting small pieces of work into the machines, thereby not only removing the oil, but leaving the work in better condition than it otherwise would be.

These separators are made in two sizes, No. 1 as shown, which has a capacity of 750 cubic inches, and which will separate in from five to eight minutes, the time being regulated by the condition and quality of the oil used.

These same conditions, of course, apply to the No. 2 or larger machine, which has a pan capacity of 3,100 cubic inches, and is proportionately heavier and stronger. The time required to separate with this machine is practically the same as with the smaller one, provided both are running at the same peripheral speed. The capacity of this machine being about four times that of the smaller, it is better adapted to bulky, light weight chips or turnings, but is equally effective on ordinary work.

Both machines are provided with inner cases or pans which can be removed to empty the contents after the oil is extracted. The pan for the larger machine is of copper, and that of the smaller of tin, both have bronze sleeves surrounding the spindles, and duplicate pans can be obtained at any time.

The machines are well made, compact and durable. The spindle quill or step is positioned between rubber springs or collars, and all are held in a casing in the base of the machine by a screw gland, so that the proper elasticity can be obtained by varying the tension of this gland. The rubbers insure easy running and obviate any liability to springing of spindle, and with proper care will do good and effective work at a very small cost for maintenance.

NO. 1 SEPARATOR.

Countershaft with 6" x 3" tight and loose pulleys should make 565 revolutions per minute. Weight of machine 340 lbs.

NO. 2 SEPARATOR.

Countershaft with 12" x 4" tight and loose pulleys should make 625 revolutions per minute. Weight of machine 1,350 lbs.

MOTOR DRIVEN OIL SEPARATOR.

DESCRIPTION FIG. 11143.

This machine is especially designed to separate the oil from chips, turnings or cuttings of any kind and from small work of all kinds that is made on screw or other machines, where oil is a factor in its production.

Oil can be separated and used again almost indefinitely, there being, of course, some waste, but small in comparison to the waste where no separator is used.

The large amount of oil annually wasted is a strong argument in favor of their use.

These machines are well made, compact and durable. The spindle quill, or step, is positioned between rubber springs and all are held in a casing in the base of the machine by a screw gland so that the proper elasticity can be obtained by varying the tension of this gland. An inner pan with bronze sleeve, surrounding spindle is provided having a capacity of 750 cubic inches and which is removed to empty the contents after the oil is extracted, which ordinarily takes from five to eight minutes.

Weight, 525 lbs.

Speed, 1,500 revolutions per minute.



FIG. 11143.

PLANERS.

22", 24" AND 27" STANDARD PATTERN PLANERS.

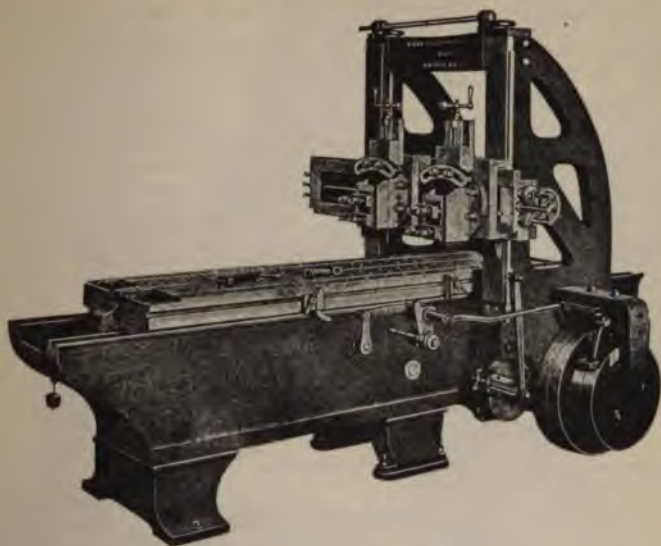


FIG. 11144.

DESCRIPTION FIG. 11144.

Illustration shows 27" planer with two heads on cross rail.

Each planer is regularly furnished with one head on cross rail, countershaft and all necessary wrenches. The 24" and 27" sizes can be supplied with two heads on rail as shown in illustration, if desired. Power elevating device for rail can be provided on the 27" size only. Four-speed attachment as shown in Fig. 11154 will be furnished for 24" and 27" planers at extra cost.

SPECIFICATIONS.

	22"	24"	27"
Planes wide.....	22"	24"	27 $\frac{3}{4}$ "
Planes high.....	22"	24"	27 $\frac{3}{4}$ "
Planes long, between pockets.....	5' 1"	6' 1"	6' 2"
Length of table, over all.....	6' 4"	7' 4"	7' 7"
Vertical lead of tool slide.....	7"	7 $\frac{1}{2}$ "	9 $\frac{1}{2}$ "
Driving pulleys.....	14" & 18" x 1 $\frac{3}{4}$ "	14" & 18" x 1 $\frac{3}{4}$ "	17" & 22" x 2"
Tight and loose pulleys on countershaft.....	12" x 3 $\frac{1}{4}$ "	12" x 4"	12" x 4"
Speed of countershaft, revolutions per minute.....	300	300	325
Weight.....	4,700 lbs.	5,400 lbs.	8,200 lbs.
Weight per extra foot of table.....	310 lbs.	375 lbs.	500 lbs.

PLANERS.

24", 26" AND 28" IMPROVED METAL PLANERS.

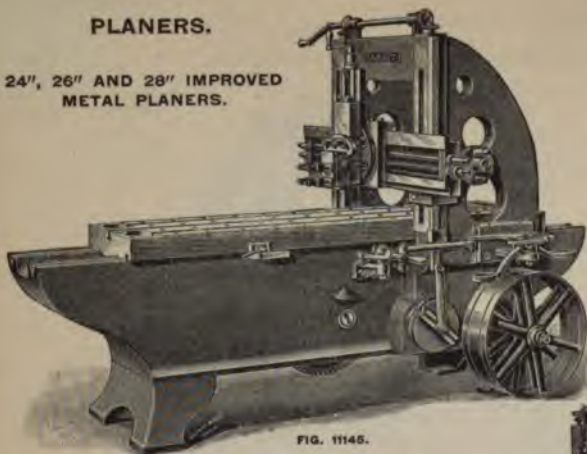


FIG. 11145.

DESCRIPTION FIG. 11145.

Built to plane any desired length.

24" x 24" x 3' weighs 5,300 lbs.

26" x 26" x 5' weighs 6,100 lbs.

28" x 28" x 6' weighs 7,400 lbs.

Countershaft pulleys, 10" x 5½".

Speed of countershaft, 350 revolutions per minute.

Extra head on cross rail and side head on rear housing can be furnished at extra cost.

30", 33" AND 36" PLANERS.

DESCRIPTION FIG. 11146.

Built to plane any desired length. Extra head on cross rail and side head on rear housing can be furnished at extra cost.

30" x 30" x 6' weighs 8,200 lbs.

33" x 33" x 6' weighs 9,100 lbs.

36" x 36" x 8' weighs 12,100 lbs.

Countershaft pulleys, 10" x 5½".

Speed of countershaft, 450 revolutions per minute.



FIG. 11146.

39", 42" AND 48" IMPROVED METAL PLANERS.

DESCRIPTION FIG. 11147.

Built to plane any desired length. Furnished regularly with one head on cross rail. Extra rail head, side head on either housing furnished at extra cost only.

39" x 39" x 8' weighs 16,000 lbs.

42" x 42" x 8' weighs 20,100 lbs.

48" x 48" x 10' weighs 23,700 lbs.

Countershaft pulleys, 10" x 5½".

Speed of countershaft, 450 revolutions per minute.

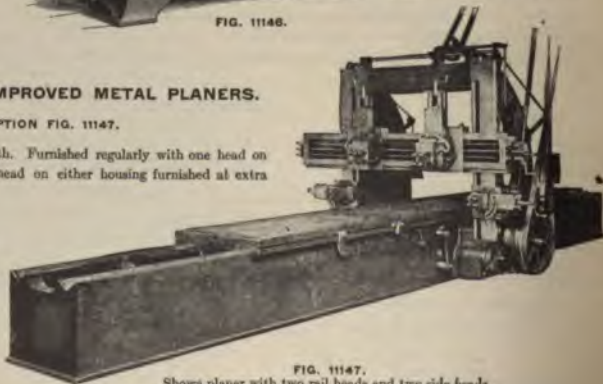


FIG. 11147.
Shows planer with two rail heads and two side heads.

PLANERS.

DESCRIPTION FIGS. 11148 AND 11149.

In designing these planers great care has been taken as regards solidity, stiffness, power, etc.

Bed very deep and heavy, and ribbed up close to make it very rigid and stiff.

Table thick and heavy, and has three deep T slots for securely fastening work. The holes in it are drilled and reamed, and it can be reversed from either side of planer.

Housings or uprights are securely bolted to wide bearings on bed, and with a heavy top brace, makes them very stiff when the rail is at the highest point.

The slides or Vs are of extra width, having oil pockets provided with rollers making them self-lubricating. All driving shafts are made of the very best of steel, fitted to extra long and large bearings.

Gears are compounded and all cut on the latest improved gear cutters, having a heavy bull wheel very large in diameter, making very powerful tools.

Cross rail is extra heavy, built in box or solid back style, and can be quickly adjusted, power elevating device for cross rail furnished on 30" and above.

The feed is transmitted to cross and down screws from a friction on the driving shaft, which releases itself, and is at all times positive.

Belt shifter moves one belt ahead of the other, so that one is off the driving pulley before the reverse belt comes on, and is fitted with a set of flanged rollers to take the strain off the studs.

All wearing surfaces are carefully scraped to a perfect fit. The 24" and 27" are made in lengths from 6' to 12'; the 30", 33", 36" and 38" from 8' to 16', and furnished with countershaft and wrenches. Can be furnished with two heads on cross rail, also side head and parallel or side drive, if so ordered, at extra cost.

Every machine thoroughly tested before leaving the factory.

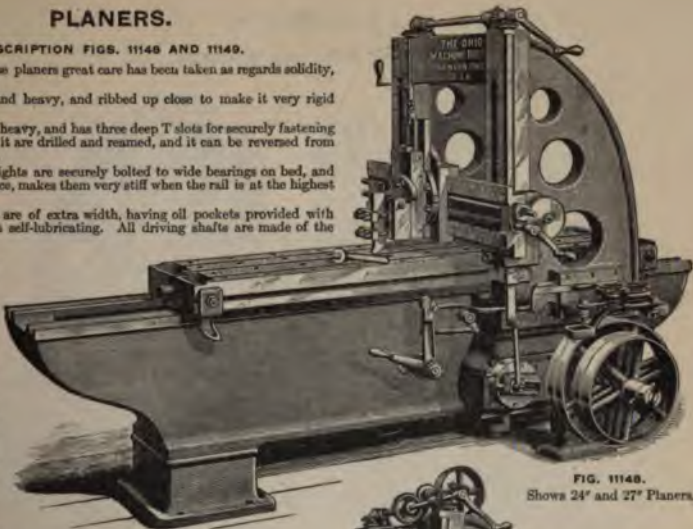


FIG. 11148.
Shows 24" and 27" Planers.

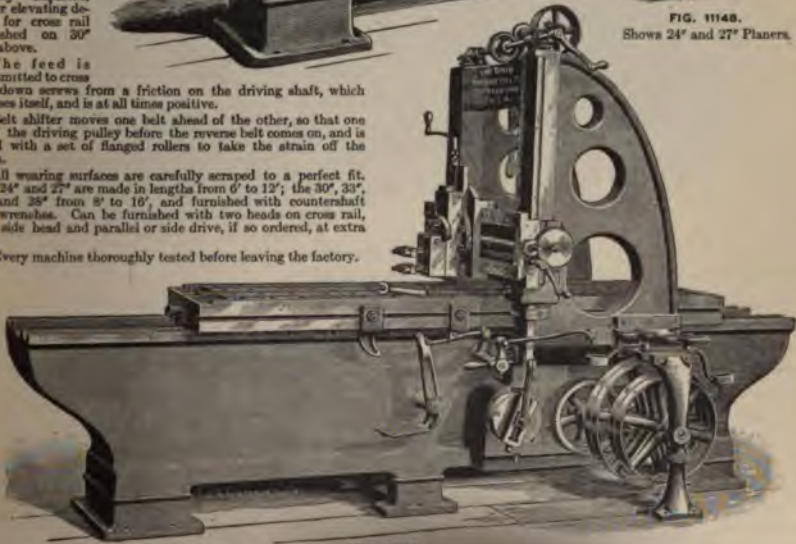


FIG. 11149.
Shows 30", 33", 36" and 38" Planers.

SPECIFICATIONS FIGS. 11148 AND 11149.

	24" x 36" x 8'	27" x 33" x 8'	30" x 36" x 8'	33" x 36" x 8'	36" x 36" x 8'	38" x 38" x 8'
Countershaft pulleys.....	10" x 4"	20" x 8"	18" x 4"	12" x 4"	12" x 4"	12" x 4"
Speed of countershaft pulley, R. P. M.....	400	200	300	425	425	425
Driving belt.....	2"	2"	2"	2"	2"	2"
Weight.....	6,300 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	11,000 lbs.	12,000 lbs.

PLANERS.

LIGHT PATTERN PLANERS.

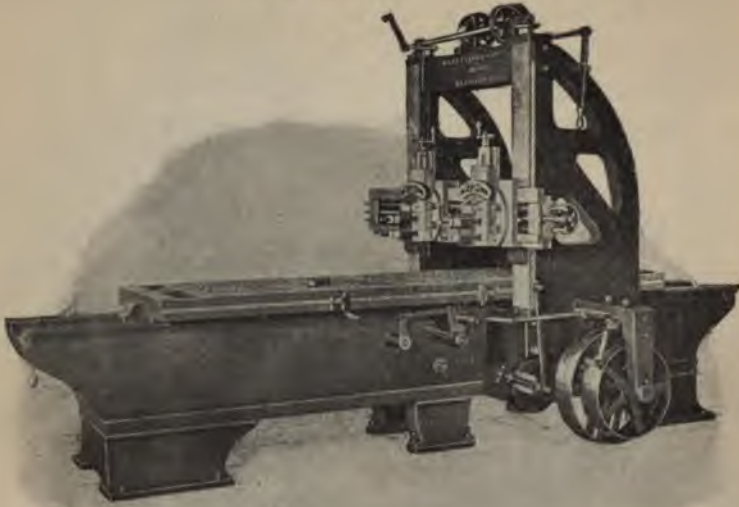


FIG. 11180.

DESCRIPTION FIG. 11180.

Illustration shows 36" size with two heads on cross rail and power elevating device.

These planers especially adapted to the requirements of shops where width between housings is of more importance than excessive weight and strength. They are capable of doing good service on cast iron, and will be found to be a very handy tool in any shop where the regular run of work is done, having a large range at a price very much below our standard planers.

Each planer is regularly furnished with one head on cross rail, countershaft and wrenches. Extra rail head, side heads and power elevating device are extra.

SPECIFICATIONS OF LIGHT PATTERN PLANERS.

	27"	36"	42"	48"
Will plane wide.....	27"	36 $\frac{1}{4}$ "	42"	48"
Will plane high.....	27"	36 $\frac{1}{4}$ "	42"	48"
Will plane long between pockets*.....	0' 1"	8' 2"	10' 2"	12' 2"
Revolutions of countershaft per minute.....	300	325	325	325
Tight and loose pulleys.....	12" x 4"	14" x 4"	14" x 4"	18" x 6"
Net weight.....	6,000 lbs.	10,200 lbs.	17,500 lbs.	23,000 lbs.

* Longer planing length can be furnished if desired.

PLANERS.

30" AND 36" STANDARD PATTERN PLANERS

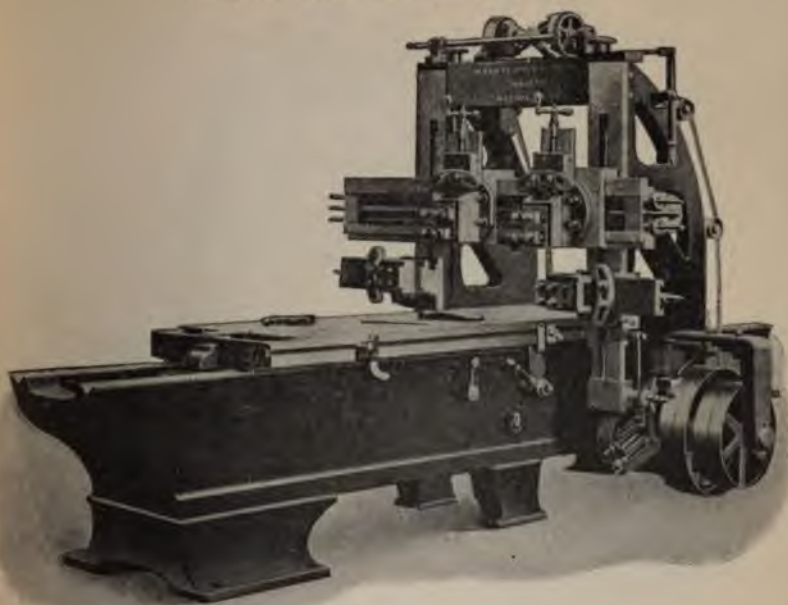


FIG. 11151.

DESCRIPTION FIG. 11151.

Illustration shows 30" planer equipped with two heads on rail, two side heads and power elevating device for cross rail.

Each planer is regularly furnished with one head on cross rail, countershaft and all necessary wrenches. Extra rail head, one or two side heads, power elevating device or four-speed attachment as shown in Fig. 11154, can be supplied at extra cost.

SPECIFICATIONS.

Planer wide.....	30"	36"
Planer high.....	30"	36"
Planer long between pockets*.....	8' 2"	10' 2"
Length of table over all*.....	9' 7"	11' 8"
Vertical feed of tool slide.....	9½"	12½"
Driving pulleys.....	17" & 22" x 2"	18" & 24" x 2½"
Tight and loose pulleys on countershaft.....	14" x 4"	14" x 4"
Speed of countershaft, revolutions per minute.....	325	325
Weight.....	9,500 lbs.	11,000 lbs.

* Longer planing bar

PLANERS.

38" AND 42" STANDARD PATTERN PLANERS.

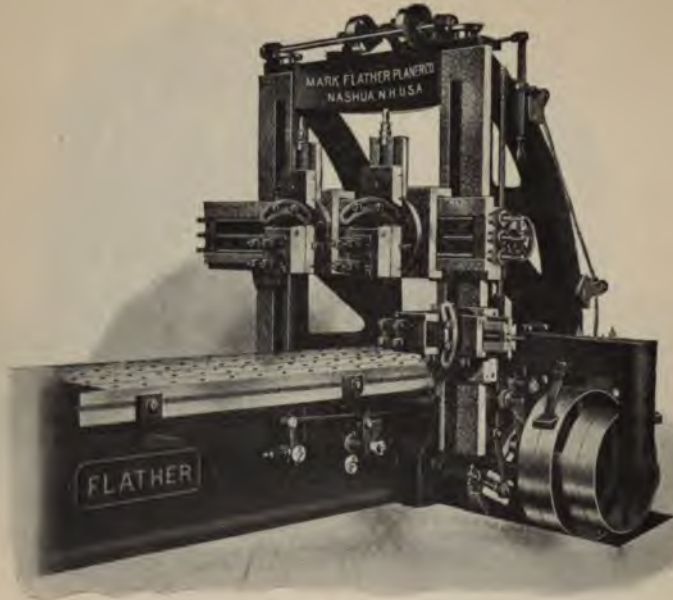


FIG. 11152.

DESCRIPTION FIG. 11152.

Illustration shows 42" planer with two heads on cross rail, one side head and power elevating device.

Each planer is regularly furnished with one head on cross rail, countershaft and all necessary wrenches. Extra rail head, one or two side heads, power elevating device for rail or four-speed attachment as shown in Fig. 11154, can be supplied at extra cost.

SPECIFICATIONS.

Planes wide.....	38"	42"
Planes high.....	38"	42"
Planes between pockets*.....	10' 2"	12' 2"
Length of table over all*.....	11' 8"	13' 8"
Vertical feed of tool slide.....	14½"	14½"
Driving pulleys.....	24" & 32" x 3¼"	22" & 28" x 2¼"
Tight and loose pulleys on countershaft.....	18" x 5¼"	18" x 6"
Speed of countershaft, revolutions per minute.....	350	350
Weight.....	19,000 lbs.	21,000 lbs.

*Longer planing length can be furnished, if desired

PLANERS.
48" AND 54" STANDARD PLANERS.



FIG. 11153.

DESCRIPTION FIG. 11153.

Illustration shows 48" planer with two heads on cross rail, one side head and power elevating device for cross rail.

Regular equipment consists of one head on cross rail, power elevating device, countershaft and wrenches.

Extra rail head, one or two side heads, or four speed device shown in Fig. 11154, can be supplied at extra cost.

The 54" planer is built in two types, light and heavy pattern, specifications for which are given below.

All gears are contained in a single compartment of the bed, the sides of which are double webbed, insuring the proper alignment of all shafts and gears.

Can be furnished to plane any desired length.

SPECIFICATIONS.

	48" Standard.	54" Light Pattern.	54" Heavy Pattern.
Planes wide.....	48½"	54"	54"
Planes high.....	48½"	54"	54"
Planes long between pockets.....	12' 2"	12' 2"	12' 2"
Countershaft pulleys.....	18" x 6"	18" x 6"	18" x 6"
Speed of countershaft, revolutions per minute.....	350	350	350
Weight.....	30,000 lbs.	32,000 lbs.	50,000 lbs.

LARGE PLANERS.

Specifications, photographs and prices of planers larger than here described will be sent upon application.

PLANERS.

STANDARD PATTERN PLANER.

EQUIPPED WITH FOUR SPEED MECHANISM AND MOTOR DRIVE.

Applicable to 24", 27", 30", 36", 38",
42", 48", and 54" standard pattern planers,
shown in Figs. 11144, 11151, 11152, 11153.

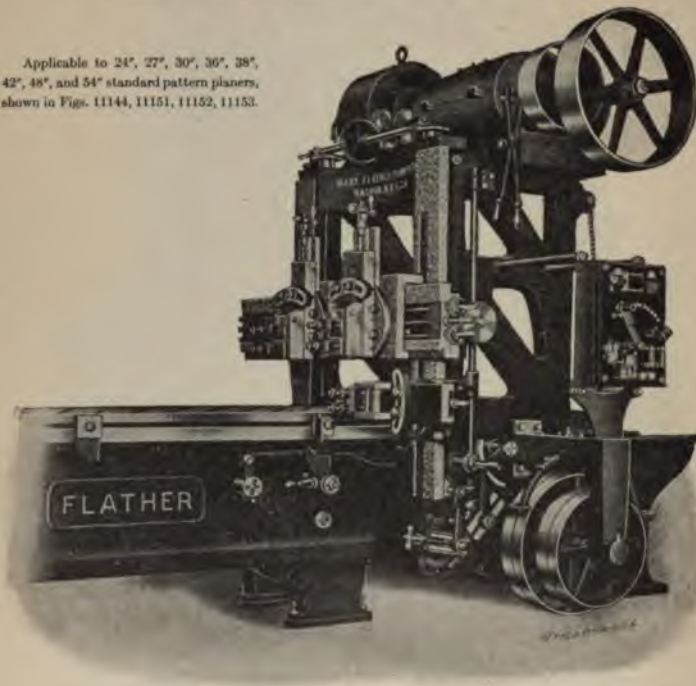


FIG. 11154.

DESCRIPTION FIG. 11154.

To meet the increased demands upon us for a planer with a larger range of work, we are now pleased to offer a four speed mechanism which will greatly increase the output of any planer to which it is attached. In the above illustration this device is shown in connection with a motor, but it will give equally satisfactory results when driven directly from the main line shafting, tight and loose pulleys being provided. We can also furnish the same attachment to be suspended from the ceiling in place of a countershaft. Planers of any make which are installed at present, or which may be installed in the future, can be thus equipped. When motor drive is desired we recommend the use of this attachment in connection with constant speed motors, in place of variable speed motors, the advantage being in the return speed always remaining the same. The four speeds are obtained by four powerful friction clutches, each operated by a lever within easy reach of the operator. Accident or injury to the mechanism is precluded by a stop, which prevents the simultaneous action of the levers, making it impossible to engage more than one of the frictions at a time. All parts of the four-speed mechanism are made sufficiently strong to withstand any power which may ever be applied; self-oiling bearings for shafts are provided, and ample provision is made for lubrication of all other parts; the frictions are simple, cannot wear out, and are tested to double the power which will ordinarily be applied to the tool on which the equipment is used.

COMBINED STANDARD AND OPEN-SIDE PLANER.

DESCRIPTION FIGS. 11155 TO 11159.

In many shops there is a demand for the occasional use of an open-side planer but not enough to warrant the purchase of a machine made exclusively for that purpose, and a standard type of planer being much better for general work the occasional open-side work is done with an extension tool at a great deal of trouble and expense. To supply this demand, we have designed and put upon the market the combined standard and open-side planer, as illustrated, the cuts being made from photographs of our 42" standard planer, changed to an open side.

As shown in the cuts, the far housing can be moved back and an extension piece placed between the cross rail and the face of the housing. In the planer shown, the distance from the point of tool to face of housing is 63", so that a piece over 5' wide can be planed. The regular cross rail for our 42" planer is long enough to square down work 63" wide with the far head and by setting the head at an angle, several inches wider can be planed.

Supplementary table to support the work slides easily in a V-way, scraped to a fit, giving a very secure outer support to which work can be bolted.

The far housing is tongued into top of bed, the cheek of which is made long enough to enable the housing to be moved back the required distance with a rack and pinion, so that the extension may be put into position and bolted to the cross rail and housing, making a very rigid support for the rail.

FRONT VIEW AS STANDARD PLANER.



FIG. 11155.

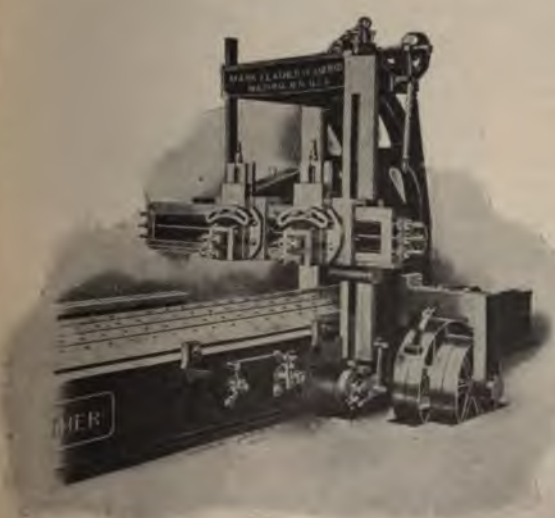


FIG. 11156.

The face of the extension is made exactly like the face of the housing and is fastened to the rail by the same means as the housing. The back part of the extension is made to fit over the two edges of the housing as well as to the face. The nut on the raising screw is disconnected from the rail and fastened to the extension and is made in such a way that the alignment of the rail is not changed by moving the housing.

The rail is made to fit over the face and both edges of the near housing and is extended above and below the regular width of the cross rail, giving greater bearing and support for the rail, so that when the far housing is removed, the rail will still be held rigidly in position.

The power raising attachment for cross rail, as shown in the cut, is driven by two friction pulleys similar to those used on countershafts for lathes. The bevel gears in this shaft drive gear in a cast-iron housing which runs

PLANERS.

COMBINED STANDARD AND OPEN-SIDE PLANER.

DESCRIPTION FIGS. 11155 TO 11159.—Continued.

The lower and larger one is driven by the pinion on the pulley shaft, the upper one driving two cross shafts. One is rigidly connected with the near housing and the other with the far housing, the one connecting the far housing being made to swivel around the central driving gear and also on the raising screw on the far housing. The shaft also telescopes through the bevel gear so that in moving the housing from one position to another the shaft is free to slide through the gear as it moves around the circle of the central gear. As these gears revolve around the central gear, the bevel pinions revolve around the driving gear and also bevel gear on the screw.

The driving gears are all contained inside the bed, which is double webbed around the gears, making a very stiff and powerful arrangement for driving the table. There

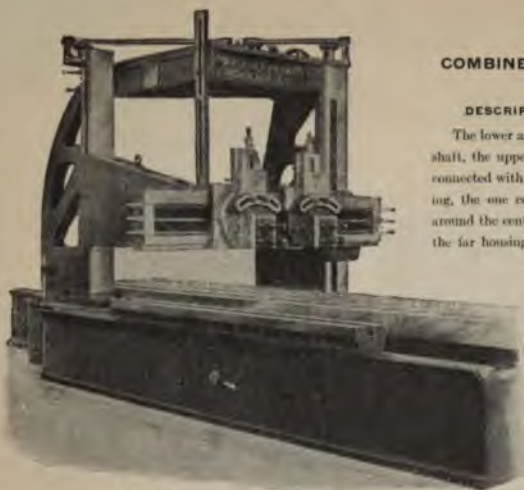


FIG. 11157.
REAR VIEW AS OPEN-SIDE PLANER.

are no cap boxes to work loose, the beds being bored out in perfect alignment and bearings lashed with bronze gun metal.

The feeding mechanism for the heads is driven by a new relief friction recently brought out by us which is positive in its action in moving feeds, but when released takes no power and does not heat.

The reversing motion provides for one belt doing its work then leaving the pulley before the other starts, preventing the disagreeable



FIG. 11158.
IN OPERATION AS AN OPEN-SIDE PLANER.

squealing of belts. The machine is entirely under the control of the operator at any part of the stroke and there is neither jar nor jerk when the machine is reversed. The reversing mechanism can be operated from either side of machine by hand and by the shipper dogs in front.

Patents have been applied for.

These planers are built to plane 30°, 36°, 42°, or 48° wide and high, with any length of table. General specifications are the same as for the standard pattern planers shown in Figs. 11151, 11152 and 11153



FIG. 11159.
IN OPERATION AS STANDARD PLANER.

PLANERS.
TRIO AND SWITCH PLANER.



NO. 1000

DESCRIPTION NO. 1000

This planer is designed with both gears for top and bottom cut, and is especially suitable for planing soft woods and for roughening timbers. It is well adapted for planing in stock yards, and for the planing of timbers.

DESCRIPTION

Frame width	48"	Planer cut per	3"
Frame height	48"	Planer cut per	10"
Frame length	102"	Planer cut per	10"
Length of table	102"	Planer cut per	10"
Vertical distance	102"	Planer cut per	10"
Maximum weight	102 lbs	Planer cut per	10"
Weight	102 lbs	Planer cut per	10"

These planers are especially adapted for planing soft woods and for roughening timbers. They are well adapted for planing in stock yards, and for the planing of timbers.

PLANERS.



FIG. 11161.

10" BENCH PLANER.

DESCRIPTION FIG. 11161.

Planes 10" wide, 10" high, and 30" long. Total length of table 36". Weight 475 lbs.

No originality is claimed in this machine. The design is but the embodiment of the best practice of the day. All the gears are cut from the solid. The pinions and racks are of steel. The flat wearing surfaces are scraped. The table is gibbed down to prevent lifting, and has three standard T-slots cut from the solid, and four rows of $\frac{1}{4}$ " holes. The head has an automatic cross-feed in either direction, also a graduated swivel which can be set at any angle and locked in the usual way.

Each planer is furnished with both countershaft for belt power and crank for hand power.

PLANER CENTERS.

6" PLANER CENTERS.

DESCRIPTION FIG. 11162.

These centers are substantially and accurately constructed, swing 6", graduated tilting head, indexed, dividing circles into twenty-four divisions.

An indexed chuck can be furnished fitting the head stock in place of the center.



FIG. 11162.

13" PLANER CENTERS.

DESCRIPTION FIG. 11163.



FIG. 11163.

These centers are provided with an improved index consisting of five circular plates or disks, each $\frac{1}{8}$ " thick and $7\frac{1}{4}$ " diameter, which are accurately cut with 44, 52, 56, 90 and 96 notches, respectively, giving a wide range of divisions. These plates are readily taken off and others substituted, with different numbers for special work. These plates being cut through like a gear, give a much stronger pin than a drilled index. This index is revolved by means of a worm and gear, which are readily disconnected (by loosening one bolt), when not required. Tongues are inserted in bottom of head, and tail stocks, and are readily taken out and fitted to the slot in any planer (by planing or filing off one side) without destroying the alignment.

The spindles, worm and screw are of steel.

Weight, 85 lbs.

20" PLANER CENTERS.

DESCRIPTION FIG. 11164.

The centers are designed for heavy work, and are provided with an improved index consisting of four circular plates or disks, each $\frac{1}{8}$ " thick and 12" diameter, which are accurately cut with 48, 110, 126 and 140 notches, respectively (giving a wide range of divisions, and these plates are readily taken off and others substituted, with different numbers for special work). These plates being cut through like a gear, gives a much stronger pin than a drilled index. This index is revolved by means of a worm and gear, which are readily disconnected (by loosening one bolt), when not required. Tongues are inserted in bottom of head and tail stocks, and are readily taken out and fitted to the slot in any planer (by planing or filing off of one side) without destroying the alignment.

The spindles, worm and screw are of steel.

Weight, 210 lbs.



FIG. 11164.

FEDERAL PLANER CHUCK.

DESCRIPTION FIG. 11165.

Jaws are 6" long, opening 4", swivel graduated base. All screws are made of steel and hardened.

These chucks are heavy and strong, and are accurately made. Will hold either straight or taper work and can be instantly adjusted from the smallest to the greatest capacity.



FIG. 11165.

ROUND SWIVEL BASE CHUCK.



FIG. 11166.

SQUARE BASE CHUCK.



FIG. 11167.

PLANER CHUCKS.

SPECIFICATIONS FIGS. 11166 AND 11167.

ROUND SWIVEL BASE CHUCK.					SQUARE BASE CHUCK.			
Size Chuck No.	Length of Jaw.*	Depth of Jaw.*	Jaws will open.*	Space required.	Approx. Shipping Weight, Lbs.	Size Chuck No.	Space required.	Approx. Shipping Weight, Lbs.
6	7"	1½"	3½"	10"	75	6	7¼" x 11"	55
8	9"	1½"	5"	11½"	95	8	9" x 12½"	65
10	11"	2½"	6"	14"	160	10	11" x 15"	110
12	13"	2½"	8"	16"	200	12	13" x 17"	130
15	15½"	2½"	9½"	20"	300	15	15½" x 21"	230
18	18½"	2½"	11¼"	22"	440	18	18½" x 24"	320
24	24¼"	2½"	16"	26"	695	24	24¼" x 28"	440
30	30¼"	3"	21½"	30"	1,200	30	30½" x 34"	1,050

* Round swivel base and square base same dimensions.

Round base chucks have a rib 1¼" wide cast on the bottom. For fitting the rib for planer table, we charge to cover extra cost. A wrench is furnished with each chuck.

SPECIAL PLANER TOOL.

FOR CURVED SURFACES.



FIG. 11168.

DESCRIPTION FIG. 11168.

We do not consider it necessary to give a full description of this planer tool, as the illustration explains it better than words can. It is a time saver, and that is what we are after. It is well proportioned, and can be attached to and used on any planer. It is made on order, any size required, and is the best tool made for planing the circular part of driving boxes and other circular work. We guarantee it to be satisfactory in every way.

Fig. 11168 shows the tool itself as usually furnished.

RADIUS PLANER ATTACHMENT.

DESCRIPTION FIG. 11169.



FIG. 11169.

This attachment is used in planing curves of any radius, and perfectly parallel curves as applied to the ordinary planing machines. A pin projecting from a plate bolted to the table of the planer holds an upper table upon which the work is fastened. Thus the work may be moved forward or backward, and to a greater or less distance from the center pin, the amount of circular movement determining the radius of the circle to which the work is finished.

From the corner of the table a wrist projects upward and takes hold of a slide which is fastened at the required angle to the beam of the planer.

When the slide stands parallel to the bed of the planer, the table will move in a straight-line. In proportion to the angle of the slide with the bed of the planer, the table will be deflected from a straight line into a true curve of greater or less radius.

In setting the link or slide box for planing, the links or blocks require to be moved as well as the radius arm, and it is best to set the ends of work in line with bed at equal distance from center bolt. By shifting the link or block some, it will favor the radius arm and require less angle to do the work.

The planing tool, if changed on the same piece of work, must be the same distance from the back of the tool to the point as the one removed, or it will vary the radius.

SINGLE MILLING ATTACHMENT FOR PLANER.

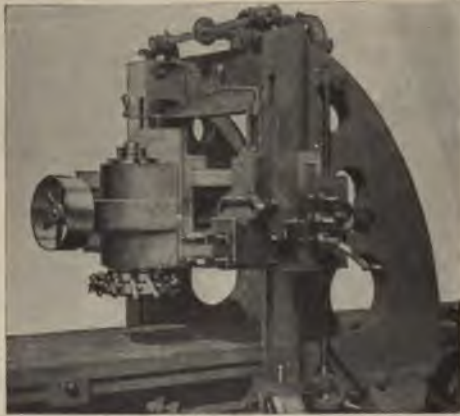


FIG. 11170. SHOWS NO. 3 ATTACHMENT.

DESCRIPTION FIG. 11170.

Made in four sizes, as follows:

- No. 1. Weight, 1,500 lbs., suitable for 24" to 30" planer.
- No. 2. Weight, 2,000 lbs., suitable for 30" to 40" planer.
- No. 3. Weight, 2,500 lbs., suitable for 36" to 50" planer.
- No. 4. Weight, 3,000 lbs., suitable for 50" and larger planer.

Regular equipment consists of 1 milling head; 1 saddle fitted to planer rail; 3 sizes pulleys for milling head; 1 bracket, fitted to planer rail, with bronze bushing; 1 countershaft with double friction clutch pulleys and drive pulley; 2 drop hangers; 1 belt tightening device with swiveled yoke pulley and weighted pulley; 1 feed mechanism with friction disk, worm wheel bored to fit planer countershaft, etc.; 1 galvanized iron tank with bracket, for lubricant; 3 spanner wrenches; 1 socket wrench.

DUPLEX MILLING ATTACHMENT FOR PLANER.

DESCRIPTION FIG. 11171.

NO. 1 DUPLEX ATTACHMENT.

Made in four sizes as follows:

- No. 1. Weighs 2,000 lbs., suitable for 24" to 30" planers.
 No. 2. Weighs 3,000 lbs., suitable for 30" to 40" planers.
 No. 3. Weighs 3,500 lbs., suitable for 30" to 50" planers.
 No. 4. Weighs 6,500 lbs., suitable for 50" and larger planers.

Regular equipment consists of 2 milling heads; 2 saddles, fitted to planer rail; 6 pulleys (3 sizes) for milling heads; 1 bracket, fitted to planer rail; 1 duplex countershaft, with double friction clutch pulleys and two drive pulleys; 2 drop hangers; 1 duplex belt tightening device, with two swivelled yoke pulleys and two weighted pulleys; 1 feed mechanism, with friction disk, worm wheel bored to fit planer countershaft, etc.; 2 galvanized iron tanks with brackets, for lubricant; 2 spanner wrenches; 1 socket wrench.



FIG. 11171.

ROTARY PLANING MACHINES.

DESCRIPTION FIGS. 11172 TO 11175.

The accompanying cuts illustrate a number of our rotary planing machines, which are now made of one general design in varying sizes, having cutterheads from 20" to 100" in diameter over tools, and may be either plain, portable, on circular sub-base, or mounted on long bed to face off both ends of work, simultaneously.

The cutterhead is driven through gearing by a pinion meshing into an internal gear on the cutterhead. Saddle movement is by means of a spiral pinion and rack, having four changes of geared feed and power quick traverse in either direction.

50" ROTARY PLANER,
ON CIRCULAR BASE,
MOTOR DRIVEN.

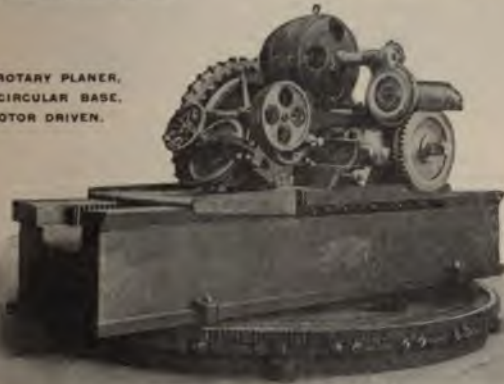


FIG. 11172.

Our method of feeding carriage, in addition to giving a smooth and even motion, does away with the long feed screw, which is frequently a source of trouble owing to its sagging and binding.

The plain machine may be either motor or belt driven as desired, the portable and sub-base machines being made motor driven only. The motor driven machine economizes greatly in floor space, as there are no overhanging parts, motor being mounted on top of saddle.

There are also a number of machines adapted to special work, which require other methods of operation.

We will be pleased to give you detailed information, weights, and prices on application. Your specifications are solicited for any machine tools that you may require.

For specifications see following page.

50" ROTARY
PLANER,
ON CIRCULAR
BASE,
MOTOR DRIVEN.

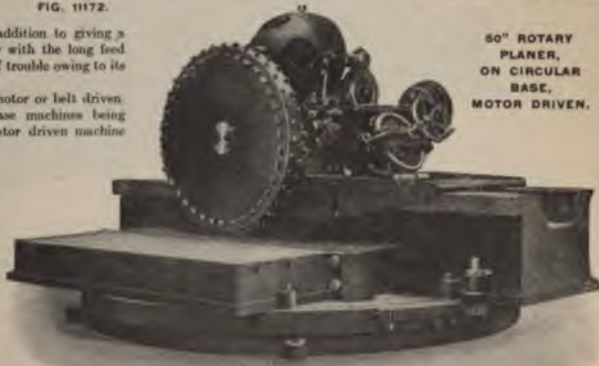


FIG. 11173.

ROTARY PLANING MACHINE.

60" DUPLEX ROTARY PLANING MACHINE.

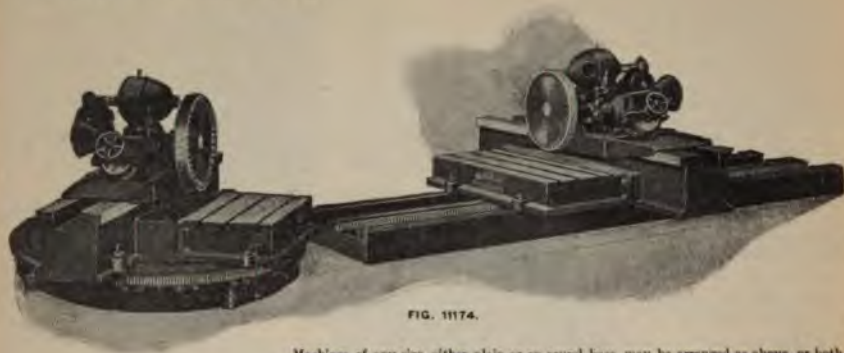


FIG. 11174.

Machines of any size, either plain or on round base, may be arranged as above, or both machines can be placed on the long bed to give any desired distance between the cutterheads.

72" PORTABLE ROTARY PLANING MACHINE, MOTOR DRIVEN.

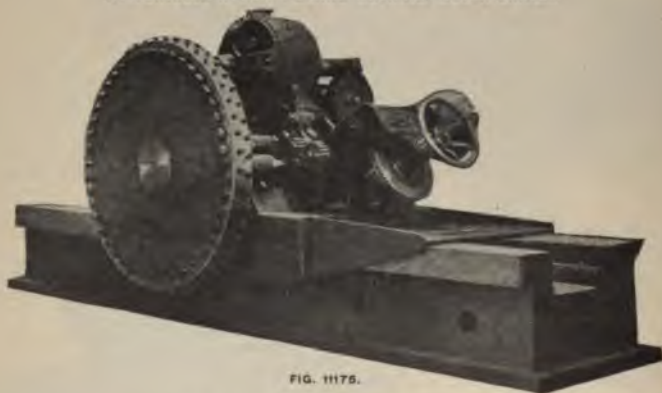


FIG. 11175.

SPECIFICATIONS FIGS. 11172 TO 11175.

	No. 1.	No. 2	No. 3.	No. 4.	No. 5.	No. 5½	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.
Diameter of cutterhead over tools.....	26"	30"	36"	42"	48"	54"	60"	72"	84"	90"	100"
Length of feed..... (Increased as desired)	5'	6'	8	8'	8'	8'	8'	8'	8'	8'	8'
In and out adjustment.....	2½'	3"	3"	3"	3½'	4"	4"	4"	4"	4"	4"
Size of work table.....	3' x 6'	3' x 7'	3' x 9'	3' x 9'	4' x 9'	4' x 9'	4' x 9'	4' x 9'	4' x 9'	4' x 9'	4' x 9'
Horse-power required.....	5	7½	10	10	15	15	20	20	25	25	25

Machines can be made to feed any length desired.

Work table on round base machines is 1' shorter than on plain machines.

VERTICAL SPINDLE ROTARY PLANING MACHINE.

DESCRIPTION FIG. 11176.

Adapted for rapidly surfacing plain surfaces, and is especially adapted for machining the joints of railway motors. Machine is belt driven or motor driven as desired. Carriage is operated by means of spiral pinion and rack having variable feed and quick power movement.

SPECIFICATIONS.

	No. 1.	No. 2.
Diameter of cutterhead over tools.....	30"	36"
Will admit between uprights.....	32"	40"
Width of carriage.....	30"	36"
Will mill in length, increased as desired	6'	6'
Minimum distance under tools.....	12"	12"
Maximum distance under tools.....	20"	20"

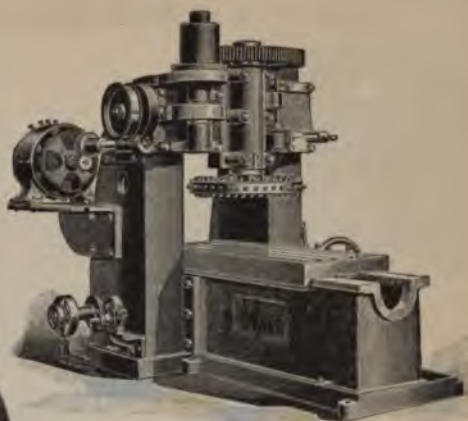


FIG. 11176. SHOWS MOTOR DRIVEN MACHINE.



No. 0 ROTARY PLANING MACHINE.

DESCRIPTION FIG. 11177

This machine varies from our standard type, in that the head is stationary and the carriage travels; is made with either 14" or 20" cutterhead. Carriage is 18" wide and 5' long to mill 4' (can be made to mill any desired length), has three changes of automatic feed, stop, and hand quick return.

FIG. 11177.

DUPLEX ROTARY PLANING MACHINE.

WITH SWIVELING HEADS.

DESCRIPTION FIG. 11178.

Cutterheads are made 15" or 20" in diameter over tools as desired, are keyed to and driven by the spindle. The heads have a feed on the cross slides, have automatic stops and can be set at any desired angle.

SPECIFICATIONS.

Diameter of cutterhead over tools.....	15"
Length of feed to cutterhead.....	30"
Distance between cutterheads, increased as desired.....	8'

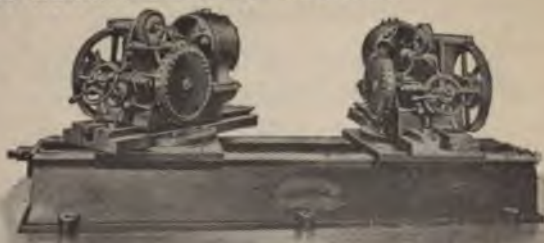


FIG. 11178.

PORTABLE VALVE SEAT ROTARY PLANING MACHINES.



FIG. 11179.

DESCRIPTION FIG. 11179

This machine was designed to face off worn valve seats, and valves of locomotives particularly, but the fact of it being so well adapted for attaching to the work, as well as the quick and accurate work that it will do, has made it a useful tool for various other kinds of work.

This tool has been greatly improved in construction since first introduced. We are substituting spur gearing instead of a train of bevel wheels. Change the cutting speed by slipping the pin shown at the end of the top shaft in or out for the variations. The lower or revolving disk is connected to the upper one with a square lock instead of a bevel ring. The teeth of the internal gear are cut from the solid. Altogether making a more durable and better machine, as experience in building and using has suggested.

The swiveling and adjusting radial arms on the top of the machine are so made that there is scarcely any shape that they cannot be attached to. One set of studs with one end blank is furnished with each machine; the top ends are threaded quite a distance to receive the adjusting and clamping nuts and washers; one side of each nut is turned convex; the washers have a large hole in them and are turned out concave, making a ball and socket clamp that will not spring the machine, even though the studs are out of line with each other.

Each machine is furnished with a sample cutting tool, wrenches and hand fly wheel, as shown in the cut. There is no breaking of port-edges, and the work is perfect, requiring no filing or scraping after the machine has been used.

The accompanying cut shows the machine in so clear a manner that it is not necessary to further explain the construction.

SPECIFICATIONS.

Size.	Size Machine will face across corners.	Maximum Distance of Stud.	Minimum Distance of Stud.	Weight Total.
18"	18"	24"	19"	245 lbs.
22"	24"	31"	23"	345 lbs.
26"	28"	35"	27"	440 lbs.
28"	32"	39"	29"	512 lbs.
30"	30"	44"	31"	600 lbs.

7" BENCH SHAPERS.

DESCRIPTION FIGS. 11180 AND 11181.

Regularly furnished with crank for hand power and countershaft for belt power. Can be supplied with column as shown in Fig. 11181, if so desired.



FIG. 11180.

Stroke of ram.....	7 3/8"
Vertical adjustment of table.....	7"
Size of table.....	6 1/2" x 7"
Traverse of table.....	9"
Number of grades on cone.....	3
Diameter of grades.....	6", 4 1/2", 3"
Width of belt.....	1 3/4"
Floor space.....	22" x 24"
Countershaft pulleys.....	7" x 2"
Revolutions of countershaft per minute.....	200



FIG. 11181.

14" CRANK SHAPER.



FIG. 11182.

DESCRIPTION FIG. 11182.

Horizontal travel of table, 19"; vertical movement of table, 14"; maximum distance ram to table, 18½"; minimum, 4½".

Has seven changes, and is automatic in either direction. Stops automatically at each end. Cross feed connecting rod adjusts itself automatically for any position of cross slide. Feed screw has adjustable, graduated collar reading to .001".

Vertical movement of 6". Is graduated and swivels to any angle through arc of 90°. Has adjustable, graduated collar reading to .001". Automatic vertical feed to head is extra.

Ten inches wide by 11" deep, and 10" high on side. Top and sides have T slots for holding vise or work. Large face plate, to be used on top of table, can be furnished at extra price.

This size shaper being intended as a quick-acting machine for light and medium work, is not made with our extension base and patented outside support to table, the same as is regularly furnished with all our other machines.

Steel-faced jaws of vise are 10" long by 2¼" high, and open 10". Vise is graduated and swivels to any angle. Vise has small centers and pair loose taper jaws.

Are provided for reading length of stroke, as also for proper step of cone for given length of stroke. Length of stroke can be adjusted and stroke positioned in relation to work while machine is in motion.

Four steps: 6¼", 8½", 10¼" and 12" diameter for 2¼" belt. Cone runs on sleeve journal bearing. Our patented "double triple quick" stroke gives eight cutting speeds to ram.

From 10 per minute back geared to 130 single geared, arranged in regular progression.

Belt speed, 35½ to 1; second train of gears, 15 to 1.

Shafting up to 2½" diameter can be keywayed under ram.

All sliding surfaces are accurately hand-scraped to surface plates, and all running bearings are lushed to preserve original centers. All gears and T slots are cut from solid metal.

Is self-oiling and has brake to stop quickly. Tight and loose pulleys are 12" x 3¼" and should make 260 revolutions per minute. All necessary wrenches are furnished.

Sixty-five inches long to allow of full movement of ram, by 37" wide.

Weight: net, 1,875 lbs.; boxed for export, 2,350 lbs. Export box occupies 60 cubic feet.

14" AND 18" CRANK SHAPERS. SINGLE GEARED.

DESCRIPTION FIGS. 11183 AND 11184.

SPECIAL FEATURES.

First.—The combination of the Whitworth quick return and the slotted lever crank movement, which makes the quickest return movement of any shaper made and the most uniform cutting speed of any crank movement used at the present time, without shock or jar.

Second.—The hand-wheel on the top of ram, by which the ram can be quickly brought to any position desired while the machine is running, and cannot slip.

Third.—The graduated collar, showing length of stroke the ram travels.

Fourth.—The adjustable slotted lever, which as the lever wears, can be adjusted and still retain its rigidity.

Fifth.—Movement of crank pin. The crank pin is adjusted by a scroll and two racks so that it is impossible for it to slip, either when tightened by the hand wheel, shown on side of machine, or when loose. The stroke can be changed while the machine is in motion, as readily as when it is at rest, and can be changed from full stroke to zero in three seconds.

Sixth.—Angle piece for supporting box table. This angle piece is bolted to the lower edge of cross rail, has an adjustable bearing on the outer edge of box table and the lower end bears on a rib cast on the front of lower part of column which projects as a bearing for the raising screw. This support is directly under the cutting tool at all times, being raised and lowered with the cross rail, which makes it unnecessary to adjust it whenever the position of the cross rail is changed.



FIG. 11183.
14" SHAPER, MOTOR DRIVEN.

Seventh.—The pitman is directly pivoted to the slide block in the ram, and the lower end slides on a shoe that has a pivotal motion on the shaft through center of column. This motion still further increases the uniformity of the cutting speed and allows the pitman to be made "yoke" shaped at the upper end, so that a long shaft can be run through the center of the column for key seating or other work. This motion also allows the large gear to be placed closely up to the underside of ram, thus reducing to a minimum the tendency of the pitman to spring and chatter as it would be apt to do if the gear was set low in the column.

SPECIFICATIONS.

Planes long.....	14"	18"
Planes wide.....	14"	18"
Planes high.....	18"	22½"
Planes high.....	14½"	15"
Vise, between jaws....	9"	10"
Jaws.....	9½" x 2"	11" x 2½"
Down feed.....	6"	6½"
Ram bearing surface..	22"	27½"
Width.....	8"	9¼"
Total length.....	37½"	46"
Height from floor....	39½"	42½"
Size of box table....	9¼" x 13"	13" x 15"
Width of belt for cone.	2½"	3"
Changes of speed.....	4	8
Largest shaft through column.....	2¾"	3"
Countershaft pulleys..	10" x 3¼"	12" x 3½"
Revolutions per minute	200	120 and 240
Finished weight.....	1,650 lbs.	2,750 lbs.



FIG. 11184. 16" SHAPER.

14" AND 16" CRANK SHAPERS.

DESCRIPTION FIGS. 11185 AND 11186.

This machine is especially designed to meet the wants of the market for a plain shaper adapted for light and medium classes of work. It is strong and substantial in every part, and provided with bearings of liberal length.

All flat bearings are carefully scraped to standard plates, insuring a high degree of accuracy for all operations performed on the machine.

Wearing surfaces are provided with gibs, susceptible of fine adjustments.

The crank lever is graduated, allowing the operator to quickly secure the desired length of stroke.

The ram is adjustable to suit the position of the work, and a short stroke can be had at any extreme or intermediate point.

The opening under the ram will admit of shafts of any length being passed through the column, and key way cut at any intermediate point.

Graduated swivel vise has steel-faced jaws, swivels to any angle, and can be held very rigidly in any position.

The table is slotted on top and both sides.

Oil holes covered with patent self-closing covers protecting bearings and wearing surfaces from chips and dust.



FIG. 11185.



FIG. 11186.

SPECIFICATIONS FIGS. 11185 AND 11186.

	14"	16"
Stroke.....	14"	16"
Cross feed.....	14"	20"
Vertical adjustment of table.....	14"	16"
Feed of tool block.....	5"	6"
Width of cone belt.....	2 1/4"	2 1/2"
Countershaft pulleys... 10"x2 1/4" 12"x3"		
Speed of countershaft, revolutions per min.	130	125
Weight.....	1,200 lbs.	1,600 lbs.

The 14" shaper is furnished as a single geared machine.

The 16" shaper may be supplied either single geared or back geared.

16" CRANK SHAPER.
SINGLE AND BACK GEARED.

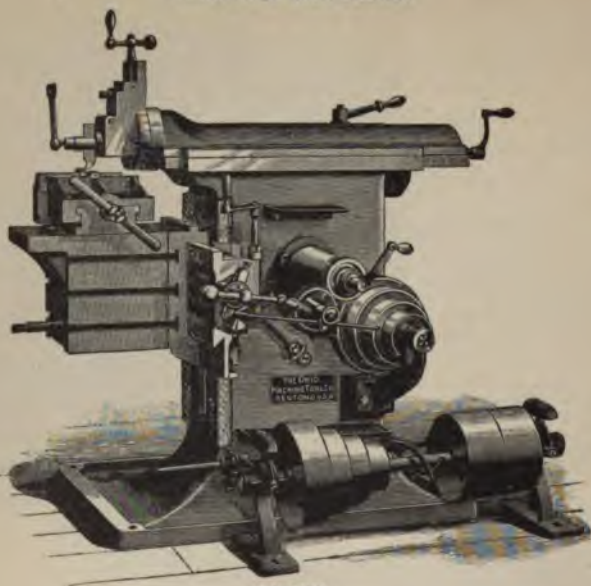


FIG. 11187.

DESCRIPTION FIG. 11187.

Design. It is symmetrical, accurate, very heavy and powerful.

Column is heavy and rigid, being well ribbed and braced, and will resist a hard strain. Has long ram bearings back and front.

Ram, very heavy and strong, and has quick return. It can be changed to make any length of stroke while in motion, at all times positive, and will invariably plane to a line.

Head swivels to any angle, is graduated and securely bolted to ram.

Rail is securely fastened to the column, very wide and heavy, being well ribbed, making it extra strong.

Table is box form, with long extension in front, very heavy and thoroughly braced, and has T slots top and sides.

Vise, large and strong, with graduated base, swivels, and is supplied with a set of adjustable centers for small work.

Workmanship and material are of the very best; all sliding bearings scraped to a surface plate. Particular attention is given to all parts and gears that are subjected to hard strain and usage, to have them the right proportion and strength. Each machine is thoroughly tested before it leaves the factory.

SPECIFICATIONS.

Length of stroke.....	16"	Belt.....	2 $\frac{3}{4}$ "
Cross traverse of table.....	24"	Vise opens.....	8"
Vertical feed of table.....	16"	Size of jaws.....	10" x 2 $\frac{1}{2}$ "
Top of table.....	11" x 15"	Tight and loose pulleys on countershaft.....	10" x 4"
Vertical feed of tool block.....	9"	Revolutions per minute, about.....	250
Bearing of ram on column.....	29"	Weight, about.....	1,800 lbs.
Steps on cone.....	4"	Weight boxed for export, about.....	2,200 lbs.

16" CRANK SHAPER.

MADE IN TWO STYLES: SINGLE GEARED OR BACK GEARED.

DESCRIPTION FIG. 1188.

Actual length of stroke.....	21 1/2"
Elemental length of table, outside.....	21 1/2"
Actual length of table.....	18"
Greatest distance from top of table.....	12"
Feed of feed shaft.....	7"
Eye bolts shaft under vise.....	21 1/2"
Size jaws, feed shaft.....	12 1/2" x 2 1/4"
Eye space.....	11 1/2"
Top of counter-shaft table.....	11" x 12"
Sides of table.....	12" x 12"

	Single Geared.	Back Geared.
Speed of run.....	5	8
Eye or cone.....	5	4
Feed changes.....	10	10
Counter pulleys.....	12" x 2" 12" x 2"	
Counter-shaft woodruffs.....	280	275
Eye space.....	30" x 12" 30" x 12"	

Weight of machine and counter-shaft..... 2,200 lbs. 2,600 lbs.
 Equipment includes outside support for table, second vice, pair taper jaws for vise; pair slotted counter; counter-shaft complete; and necessary woodruffs.

Single geared shaper has five evenly graded speeds, giving run from 5 to 85 strokes per minute.

Back geared shaper is provided with our novel double train of back gearing, with its feed wheel, giving eight changes of speed for every change of stroke, ranging from 8 to 120 strokes per minute. This method by the varying speeds and cutting power is continuously adjusted to suit the variousness of work and grades of material, with the high rotating speeds of shafts and so, on short strokes, which are unobtainable other methods of back gearing. (Patent pending.)



FIG. 1188.



FIG. 1189.

16" AND 20" EXTENSION BASE CRANK SHAPERS.

SPECIFICATIONS FIG. 1189.

	16"	20"
Planes, width.....	21"	24"
Takes between table and ram.....	20 1/2"	20 1/2"
Vertical feed to head.....	7"	7"
Grades to cone on machine.....	4	4
Number of speeds to run.....	5	5
Size of vise jaws.....	12" x 2 1/4" 12 1/2" x 2 1/4"	
Vise jaws open.....	14 1/2"	14 1/2"
Counter pulleys, tight and loose.....	12" x 4"	12" x 4"
Should make revolutions per minute.....	280	300
Width of belt to machine.....	21 1/2"	21 1/2"
Working floor space.....	62" x 40"	63" x 44"
Weight, net.....	2,775 lbs.	3,250 lbs.
Weight, boxed.....	3,350 lbs.	3,800 lbs.

16" CRANK SHAPER.
SINGLE AND BACK GEARED.

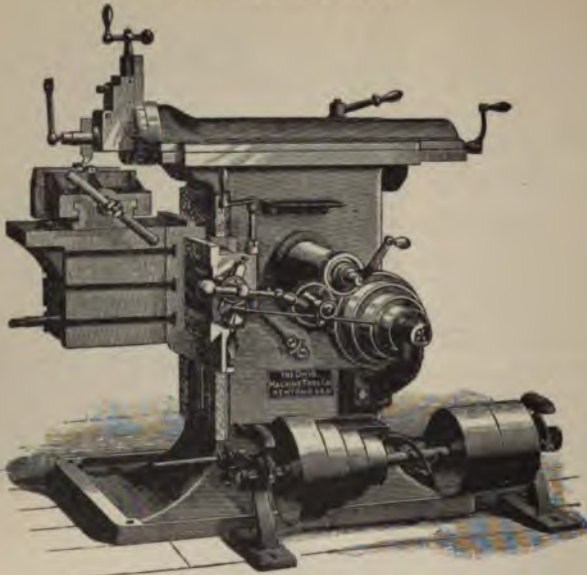


FIG. 11187.

DESCRIPTION FIG. 11187.

Design. It is symmetrical, accurate, very heavy and powerful.

Column is heavy and rigid, being well ribbed and braced, and will resist a hard strain. Has long ram bearings back and front.

Ram, very heavy and strong, and has quick return. It can be changed to make any length of stroke while in motion, at all times positive, and will invariably plane to a line.

Head swivels to any angle, is graduated and securely bolted to ram.

Rail is securely fastened to the column, very wide and heavy, being well ribbed, making it extra strong.

Table is box form, with long extension in front, very heavy and thoroughly braced, and has T slots top and sides.

Vise, large and strong, with graduated base, swivels, and is supplied with a set of adjustable centers for small work.

Workmanship and material are of the very best; all sliding bearings scraped to a surface plate. Particular attention is given to all parts and gears that are subjected to hard strain and usage, to have them the right proportion and strength. Each machine is thoroughly tested before it leaves the factory.

SPECIFICATIONS.

Length of stroke.....	16"	Belt.....	2 1/4"
Cross traverse of table.....	24"	Vise opens.....	8"
Vertical feed of table.....	16"	Size of jaws.....	10" x 2 1/4"
Top of table.....	11" x 15"	Tight and loose pulleys on countershaft.....	10" x 4"
Vertical feed of tool block.....	9"	Revolutions per minute, about.....	250
Bearing of ram on column.....	29"	Weight, about.....	1,600 lbs.
Steps on cone.....	4"	Weight boxed for export, about.....	2,200 lbs.

16" CRANK SHAPER.

MADE IN TWO STYLES: SINGLE GEARED OR BACK GEARED.

DESCRIPTION FIG. 11166.

Actual length of stroke.....	17 1/2"
Horizontal travel of table, automatic.....	21 3/4"
Vertical travel of table.....	18"
Greatest distance ram to table.....	19"
Feed of tool block.....	7"
Keys sets shaft under ram.....	2 1/2"
Vise jaws, tool steel.....	12 1/2" x 2 1/4"
Vise opens.....	11 1/2"
Top of universal box table.....	11" x 12"
Sides of table.....	12" x 13"

	Single Geared	Back Geared
Speeds of ram.....	5	8
Slaps on cone.....	5	4
Feed changes.....	10	10
Countershaft pulleys.....	12" x 3"	12" x 3"
Countershaft revolutions.....	200	275
Floor space.....	50" x 72"	50" x 72"

Net weight of machine and countershaft..... 2,200 lbs. 2,600 lbs.
 Equipment includes outside support for table; swivel vise; pair taper jaws for vise; pair hardened centers; countershaft complete; and all necessary wrenches.

Single geared shaper has five evenly graded sine speeds, giving ram from 9 to 85 strokes per minute.

Back geared shaper is provided with our improved double train of back gearing, with double bull wheel, giving eight changes of speed for every change of stroke, ranging from 7 to 125 strokes per minute. This method allows the cutting speeds and cutting power to be conveniently adjusted to suit the various classes of work and grades of material, without the high rotating speeds of shafts and gears, in short strokes, which are unavoidable in other methods of back gearing. (Patent pending.)



FIG. 11166.



FIG. 11165.

16" AND 20" EXTENSION BASE CRANK SHAPERS.

SPECIFICATIONS FIG. 11165.

Planes, width.....	16"	20"
Takes between table and ram.....	21"	24"
Vertical feed to head.....	20 1/2"	20 1/2"
Grades to cone on machine.....	7"	7"
Number of speeds to ram.....	4	4
Size of vise jaws.....	8	8
Vise jaws open.....	12" x 2 1/4"	12" x 2 1/4"
Counter pulleys, tight and loose.....	14 1/2"	14 1/2"
Should make revolutions per minute.....	12" x 4"	12" x 4"
Width of belt to machine.....	280	300
Working floor space.....	2 1/2"	2 1/2"
Weight, net.....	82" x 40"	93" x 44"
Weight, boxed.....	2,775 lbs.	3,250 lbs.
	3,250 lbs.	3,600 lbs.

16" CRANK SHAPER.
SINGLE AND BACK GEARED.

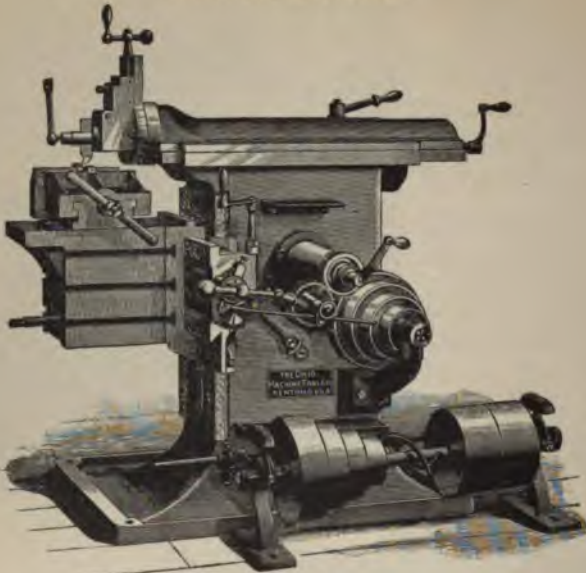


FIG. 11187.

DESCRIPTION FIG. 11187.

Design. It is symmetrical, accurate, very heavy and powerful.

Column is heavy and rigid, being well ribbed and braced, and will resist a hard strain. Has long ram bearings back and front.

Ram, very heavy and strong, and has quick return. It can be changed to make any length of stroke while in motion, at all times positive, and will invariably plane to a line.

Head swivels to any angle, is graduated and securely bolted to ram.

Rail is securely fastened to the column, very wide and heavy, being well ribbed, making it extra strong.

Table is box form, with long extension in front, very heavy and thoroughly braced, and has T slots top and sides.

Vise, large and strong, with graduated base, swivels, and is supplied with a set of adjustable centers for small work.

Workmanship and material are of the very best; all sliding bearings scraped to a surface plate. Particular attention is given to all parts and gears that are subjected to hard strain and usage, to have them the right proportion and strength. Each machine is thoroughly tested before it leaves the factory.

SPECIFICATIONS.

Length of stroke.....	16"	Belt.....	2 1/4"
Cross traverse of table.....	24"	Vise opens.....	8"
Vertical feed of table.....	16"	Size of jaws.....	10" x 2 1/4"
Top of table.....	11" x 15"	Tight and loose pulleys on countershaft.....	10" x 4"
Vertical feed of tool block.....	9"	Revolutions per minute, about.....	250
Bearing of ram on column.....	29"	Weight, about.....	1,800 lbs.
Steps on cone.....	4"	Weight boxed for export, about.....	2,200 lbs.

16" CRANK SHAPER.

MADE IN TWO STYLES: SINGLE GEARED OR BACK GEARED.

DESCRIPTION FIG. 11188.

Actual length of stroke.....	17½"
Horizontal travel of table, auto- matic.....	21½"
Vertical travel of table.....	18"
Greatest distance run to table.....	19"
Feed of tool block.....	7"
Keys seats shaft under ram.....	2½"
Vise jaws, tool steel.....	12½" x 2¼"
Vise opens.....	11½"
Top of universal box table.....	11" x 12"
Sides of table.....	12" x 13"

	Single Geared.	Back Geared.
Speeds of ram.....	5	8
Steps on cone.....	5	4
Feed changes.....	10	10
Countershaft pulleys.....	12" x 3"	12" x 3"
Countershaft revolutions.....	200	275
Floor space.....	50" x 72"	50" x 72"
Net weight of machine and countershaft.....	2,200 lbs.	2,600 lbs.

Equipment includes outside support for table, swivel vise; pair taper jaws for vise; pair hardened centers; countershaft complete; and all necessary wrenches.

Single geared shaper has five evenly graded cone speeds, giving run from 9 to 85 strokes per minute.

Back geared shaper is provided with our improved double train of back gearing, with double bull wheel, giving eight changes of speed for every change of stroke, ranging from 7 to 125 strokes per minute. This method allows the cutting speeds and cutting power to be conveniently adjusted to suit the various classes of work and grades of material, without the high rotating speeds of shafts and gears, on short strokes, which are unavoidable in other methods of back gearing. (Patent pending.)



FIG. 11188.

16" AND 20" EXTENSION BASE CRANK SHAPERS.

SPECIFICATIONS FIG. 11189.

Planes, width.....	16"	20"
Takes between table and ram.....	21"	24"
Vertical feed to head.....	20½"	20½"
Grades to cone on ma- chine.....	7"	7"
Number of speeds to run	4	4
Size of vise jaws.....	8	8
Vise jaws open.....	12" x 2½"	12" x 2½"
Counter pulleys, tight and loose.....	14½"	14½"
Should make revolutions per minute.....	12" x 4"	12" x 4"
Width of belt to machine.	280	300
Working floor space.....	2½"	2½"
Weight, net.....	62" x 40"	93" x 44"
Weight, boxed.....	2,775 lbs.	3,250 lbs.
	3,250 lbs.	3,900 lbs.



FIG. 11189.

18" AND 22" SINGLE OR BACK GEARED CRANK SHAPERS.

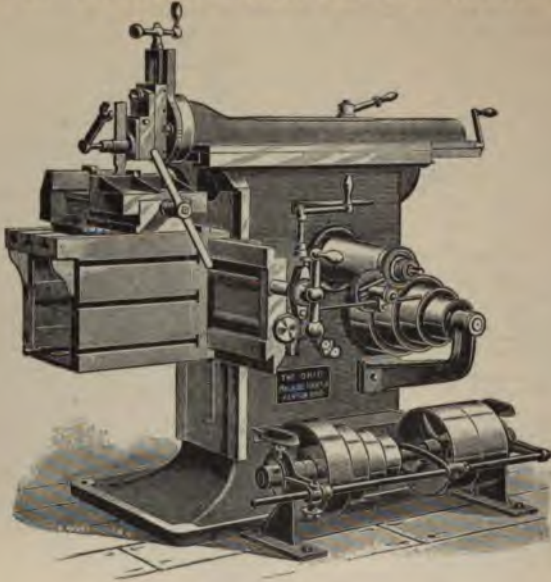


FIG. 11190.

DESCRIPTION FIG. 11190.

Design. They are symmetrical, accurate, very heavy and powerful.
 Column is heavy and rigid, being well ribbed and braced, and will resist a hard strain. Has long ram bearings back and front.
 Ram, very heavy and strong, and has quick return. It can be changed to make any length of stroke while in motion, at all times positive, and will invariably plane to a line.
 Head swivels to any angle, is graduated and securely bolted to ram.
 Rail is securely fastened to the column, very wide and heavy, being well ribbed, making it extra strong.
 Table is box form, with long extension in front, very heavy and thoroughly braced, and has T slots top and sides.
 Vise, large and strong, with graduated base, swivels, and is supplied with a set of adjustable centers for small work.
 Workmanship and material are of the very best; all sliding bearings scraped to a surface plate. Particular attention is given to all parts and gears that are subjected to hard strain and usage, to have them the right proportion and strength. Each machine is thoroughly tested before it leaves the factory.

SPECIFICATIONS.

	18"	22"
Stroke of ram.....	18"	22"
Cross traverse of table.....	25"	26"
Vertical feed of table.....	16"	16"
Top of table.....	12½" x 16½"	13" x 17"
Vertical feed of tool block.....	9"	9"
Bearing of ram on column.....	28½"	32"
Steps on conc.....	4"	4"
Belt.....	3"	3"
Vise opens.....	11"	11"
Size of jaws.....	10" x 2¼"	10" x 2¼"
Tight and loose pulleys on counter.....	10" x 4"	10" x 4"
Revolutions per minute, about.....	225	225
Weight, about.....	2,000 lbs.	2,200 lbs.
Weight, boxed for export, about.....	2,500 lbs.	2,700 lbs.

20" AND 25" CRANK SHAPERS.

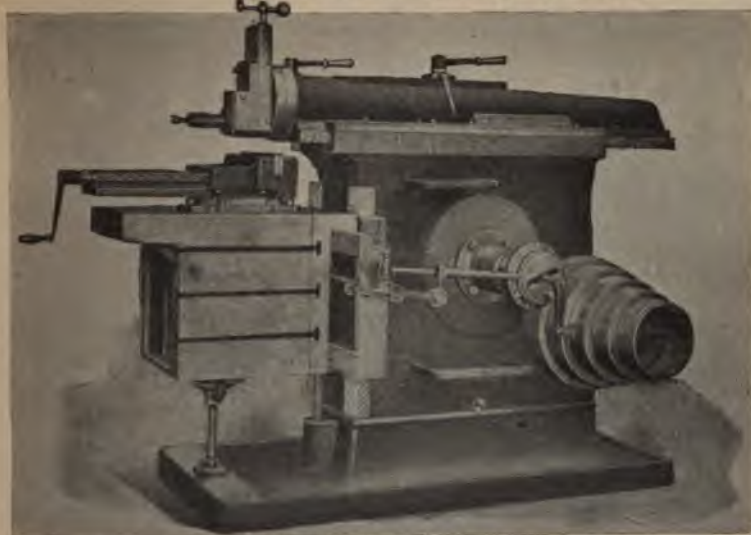


FIG. 11191. SHOWS 20" SHAPER.

DESCRIPTION FIG. 11191

In this machine are embodied all the latest practical features which a shaper of this type should possess; besides which, it contains advanced improvements, which allow of all adjustments being made with ease and rapidity. Particular attention is called to the following details:

All flat bearings are carefully scraped to standard plates, insuring a high degree of accuracy for all operations performed on the machine. All wearing surfaces are provided with gibs, susceptible of fine adjustments. Shaft bearings are unusually long and provided with liberal oil channels.

The stroke of the shaper can be changed or adjusted instantly while the machine is in motion or at rest. The device for changing the stroke is self-locking, preventing any possible chance for the stroke to vary, while the machine performs its work. The ram is adjustable to suit the position of the work, and a short stroke can be had at any extreme or intermediate point.

The opening under the ram will admit of shafts of any length being passed through the column, and key way cut at any intermediate point.

The graduated index, showing the length of stroke the machine is taking, is attached to the top of column in plain view of the operator.

Feed screws are provided with micrometer graduations; a very desirable feature for use in cutting rack, duplicating key seats, and other work of like nature.

The tool head can be instantly set and very rigidly held at any angle by means of the lever shown. This has proved to be quite an improvement over the old style way of securing the head with bolts, as it draws the tool head squarely across the face of the ram and will not move while being tightened.

The feed can be changed instantly while the machine is in motion. The plate is drilled and graduated to correspond with the teeth in the feed ratchet, and is so arranged that the feed can take place at either end of the cut.

The table is slotted on top and both sides. It can readily be removed and work bolted to the slotted apron, to which the table is attached. Top of table being slotted, its entire length, affords a very liberal clamping surface.

Graduated swivel vise has steel-faced jaws and can be used on the sides as well as on top of table. Can also be attached so that the jaws will project past either side of the table. Swivels to any angle, and can be very rigidly held in any position.

SPECIFICATIONS

	20"	25"		20"	25"
Length of stroke	20"	25"	Size belt required on countershaft	31 1/2"	4"
Automatic cross feed	25"	27 1/2"	Speed of countershaft, revolutions per minute	155	125
Vertical adjustment of table	15"	14"	Weight of machine	2,500	3,025
Feed of tool block	8"	9"	Largest diameter of shaft that can be inserted in opening under ram	3"	3 1/2"
Number steps on cone pulley	4	5	Size top of table	19" x 20"	18" x 25"
Size belt required on cone pulley	3"	3 1/4"	Graduated swivel vise, opens to	11 1/2"	15"
Length of ram bearing in column	32"	36"	Graduated swivel vise, depth jaws	2"	2 1/4"
Number of cutting speeds to ram	7	10	Graduated swivel vise, width jaws	11"	12"
Diameter tight and loose pulleys on countershaft	12"	14"			

Note: The 20" shaper can be furnished either back geared or single geared.

The 25" shaper is furnished back geared only.

Regular equipment consists of vise, countershaft and wrenches

24" CRANK SHAPER.

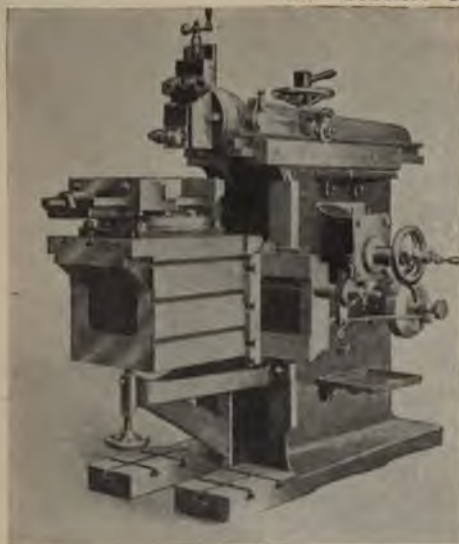


FIG. 11192.

BACK GEARED, WITH POWER DOWN FEED TO HEAD.

DESCRIPTION FIG. 11192.

Planes long.....	24"
Planes wide.....	26"
Planes high.....	16½"
Vise, between jaws.....	13¼"
Jaws.....	14" x 2¼"
Down feed.....	8½"
Ram-bearing surface.....	36"
Width.....	10¾"
Total length.....	60"
Height from floor.....	43"
Size of box table.....	13½" x 22"
Width of belt for cone.....	3¼"
Changes of speed.....	16
Largest shaft through column.....	3½"
Countershaft pulleys.....	14" x 4"
Revolutions per minute.....	100 and 200
Finished weight.....	4,500 lbs.

For description of special features, see description of 18" shaper, Fig. 11184, which is of similar construction.

24" AND 34" EXTENSION BASE CRANK SHAPERS.

SPECIFICATIONS FIG. 11193.

Planes, width.....	24"	34"
Taken between table and ram.....	50	38
Vertical feed to head.....	8	9
Grades to cone on machine.....	4	4
Number of speeds to ram.....	8	8
Size of vise jaws.....	14x3	18x5
Vise jaws open.....	15	21
Counters pulleys, T. & L. 14x4½	16x4½	
Shoulder pulleys, E. P. M. 20	300	
Width of belt to machine.....	3½	4
Working floor space.....	106x50	120x56
Weight, net, lbs.....	4,500	7,800
Weight, loaded, lbs.....	4,800	9,450

Each machine is provided with vise, countershaft and all necessary wrenches. Automatic down feed for head, as shown in cut, is furnished regularly on the 34" shaper, but at extra cost only on the 24" size.

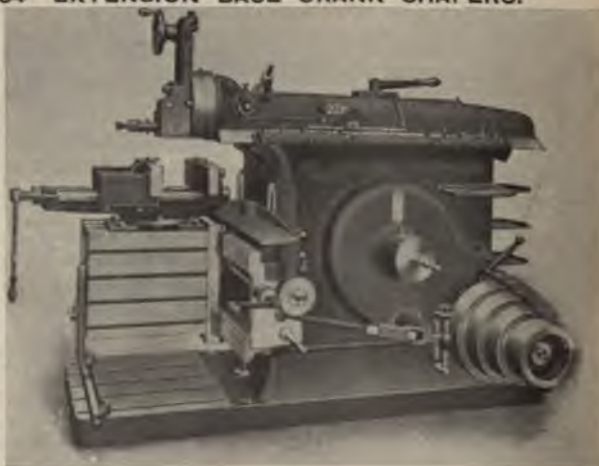


FIG. 11193. SHOWS 34" SHAPER.

21" AND 28" TRIPLE GEARED SHAPERS.

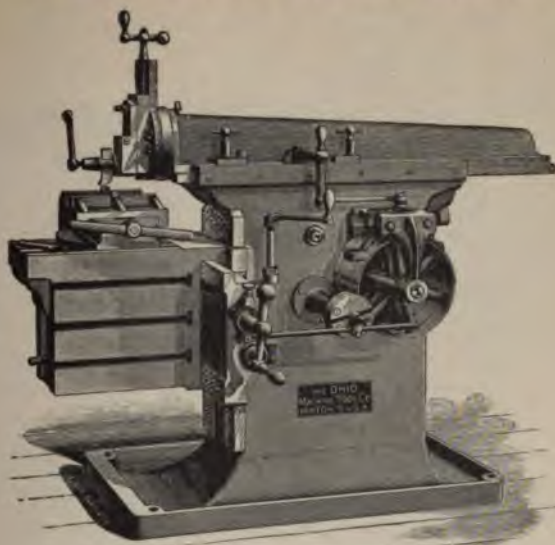


FIG. 11194.

DESCRIPTION FIG. 11194.

Design of our triple geared shapers is symmetrical, and they are very heavy and powerful, adapted to a large range of work in the least possible time, using wide belt, giving great power.

Column very heavy, well ribbed and braced in the right place to give them great strength. The ram slides project back and front.

Ram is exceptionally heavy, well ribbed and braced inside; has opening underneath for key seating.

Gears are compound, consisting of two large, wide, heavy bull wheels and one intermediate wheel, matching into rack and pinions, giving exceedingly great power, all cut on Brown & Sharpe latest improved gear cutters, from solid stock.

Rail wide and very heavy, securely fastened to column, well ribbed, making it very rigid and stiff.

Head swivels to any angle, is graduated, and is securely fastened to ram.

Table is large and heavy, and has T slots for fastening work; box form, with long extension in front; it is well ribbed and braced.

Vise is exceedingly large and heavy, has graduated base, swivels, and can be set at any angle, is supplied with a set of adjustable centers for small work.

Shifting device is undoubtedly the very best in use; it is simple, noiseless and always positive.

Workmanship and material of the very best, all flat bearings being scraped to surface plates, truly squared and accurately fitted. Any part can be adjusted by the operator without changing his position. Every machine thoroughly tested before leaving the factory. Circular attachment and mold makers' vise can be furnished at extra cost.

SPECIFICATIONS.

Stroke.....	21"	28"
Cross traverse of table.....	25"	30"
Bearings of ram on column.....	26"	34"
Vertical adjustment of table.....	18"	18"
Top of table.....	13' x 19"	14' x 22"
Vertical feed of tool block.....	10"	11"
Belt.....	1½"	2"
Swivel vise opens.....	11½"	11½"
Diameter speed pulleys on counter.....	8" and 19"	8" and 24"
Diameter of driving pulleys on counter.....	12"	12"
Diameter of driving pulleys on shaper.....	12"	12"
Revolutions per minute.....	280 and 425	280 and 425
Weight, about.....	2,000 lbs.	2,700 lbs.
Weight, for export, about.....	2,500 lbs.	3,300 lbs.

24", 28" AND 32" TRIPLE GEARED SHAPERS.

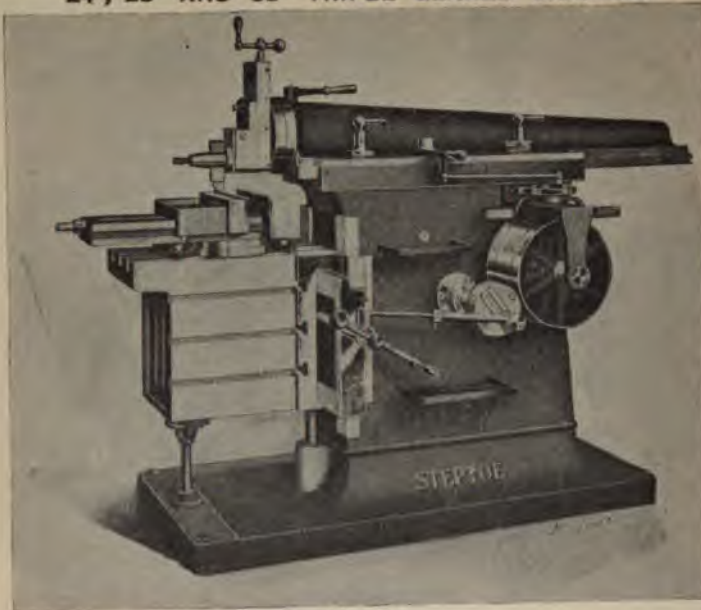


FIG. 11195.

DESCRIPTION FIG. 11195.

All flat bearings are carefully scraped to standard plates, insuring a high degree of accuracy for all operations performed on the machine. All wearing surfaces are provided with gibs, susceptible of fine adjustments. Shaft bearings are extra long and provided with liberal oil channels.

The driving pinion and intermediate gear are on the outside of the machine, permitting the use of an extra large gear, increased speed of pulleys and subsequent gain of power. Cutter bar is driven by two rack gears of large diameter placed on opposite sides of the cutter bar. Racks are of steel cut from the solid bar.

The belts are shifted by means of a circular plate having eccentric slots which receive the studs on the shifter arms. These slots are of such form as to shift one belt before the other, preventing the disagreeable squealing of belts. By this arrangement the shifters are always locked, so that the belts cannot move them. This will be found of special advantage when it is desired to stop the machine (without stopping the countershaft) to examine or remove the work.

The opening under the ram admits of long lengths of shafting being passed through the column for cutting key ways at any intermediate point.

Feed screws are provided with micrometer graduations; a very desirable feature for use in cutting rack, duplicating key seats and other work of like nature.

The tool head can be instantly set and very rigidly held at any angle by means of the lever shown. This has proved quite an improvement over the old style way of securing the head with the bolts, as it draws the tool head squarely across the face of the ram and will not move while being tightened.

The table is slotted on top and both sides. It can readily be removed and work bolted to the slotted apron, to which the table is attached. Top of table, being slotted its entire length, affords a very liberal clamping surface.

Graduated swivel vise has steel faced jaws and can be used on the sides as well as on the top of table. Can also be attached so that the jaws will project past either side of the table. Swivels to any angle, and can be very rigidly held in position.

The countershaft is arranged to give two speeds to the machine, and should make 220 revolutions per minute for steel, and 250 revolutions for cast iron. The return of the cutter bar is twice as fast as its cutting speed, but can be increased if desired.

SPECIFICATIONS.

Length of stroke.....	26"	30"	34"
Automatic cross feed.....	25"	28"	28"
Vertical adjustment of table.....	16"	14"	14"
Feed of tool block.....	3"	9"	9"
Length of ram bearing in column.....	32"	34"	34"

SINKER HEAD SHAPER.

FOR STEEL CASING FOUNDRIES; MADE IN ONE SIZE ONLY.

DESCRIPTION FIG. 11196.

The purpose for which this tool is designed is rough shaping or planing off of sinker heads, gates and risers from steel castings, locomotive driving boxes, etc., which have not been sufficiently finished by sawing or other process, or where a saw would not be used at all. It is a heavy, powerful machine, designed especially for this class of work.

The capacity, owing to its long stiff ram, large strong vice (large opening), ample frame, and large, wide cone pulley, is such as to cover all work coming within range of this tool, and it will often do work that is usually put upon a planer.

The power is great and equal to all requirements.

The proportion is large and heavy, and well calculated to withstand all strains put upon it.

Face plate.—A large face plate (not shown in cut) is furnished to replace vice jaw, and is used for strapping down large or irregular work.



FIG. 11196.

SPECIFICATIONS.

Stroke.....	17"	Vise jaws open.....	26½"
Height from vise slide.....	13½"	Net weight, about.....	7,100 lbs.
Planes, width.....	42"	Boxed weight, about.....	8,350 lbs.
Size vise jaws.....	31½" x 24"		

6" x 9" TRAVERSE HEAD SHAPER.

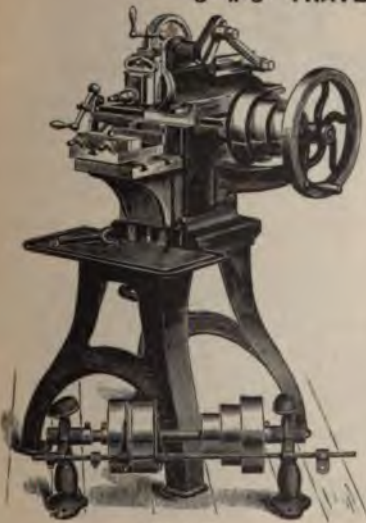


FIG. 11197.

DESCRIPTION FIG. 11197

Machine is built in three styles, as follows:
 Style 1. With swivel chuck complete, as shown in cut.
 Style 2. Hand machine, without cone and countershaft.
 Style 3. Hand machine for bench, without plate and legs.
 Plain chuck, 9" long, furnished at extra cost.

This shaper, with countershaft and swivel chuck, with length of traverse 14", including plain chuck 14" long, is also built to order only.

SPECIFICATIONS

Length of stroke, 6".
 Length of traverse, 9".
 Greatest distance between tool and table, 8".
 Driving pulleys on countershaft, 6" for 2½" belt.
 Cone pulley, three step, 3", 4½", 6" for 1½" belt.
 Countershaft, revolutions per minute, 220.
 Size of swivel chuck, 7" long, 4¼" between jaws, 1¼" deep.
 Weight, 450 lbs.
 Boxed for export, 40" x 28" x 29", 600 lbs.
 Floor space required, 29" x 25".

8" x 12" TRAVERSE HEAD SHAPER.

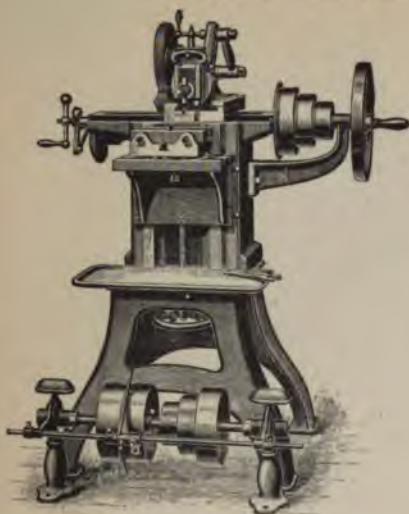


FIG. 11198.

10" x 15" TRAVERSE HEAD SHAPER.

DESCRIPTION FIG. 11199.

The 10" machine, being on a pedestal, admits the placing of long work in front of the machine, for which there is provided a face plate, for attaching such work as legs of machines, etc., and to which also may be attached any angle plate, either in a right or left hand position. The swivel chuck may be fastened to either the face plate or angle plate.

Length of stroke, 10".

Length of traverse, 15".

Greatest distance between tool and table, 18".

Distance under tool, after removing table, for long work, 36".

Driving pulleys on countershaft, 10" for 2½" belt.

Cone pulley, three step, 4¾", 6½", 8" for 2" belt.

Countershaft, revolutions per minute, 100.

Size of swivel chuck, 9½" long, 6" between jaws, 1½" deep.

Weight, 1,000 lbs.

Boxed for export, 52" x 35" x 33", 1,200 lbs.

Floor space required, 25½" x 27".

The following items are furnished at extra cost only:

Front face plate.

Angle plate, as shown in cut.

Plain chuck, 15" long.

DESCRIPTION FIG. 11198.

Machine is built in three styles, as follows:

Style 1. With swivel chuck, complete as shown in cut.

Style 2. Hand machine, without cone and countershaft.

Style 3. Hand machine for bench, without legs and plate.

Plain chuck, 12" long, can be supplied at extra cost.

SPECIFICATIONS.

Length of stroke, 8".

Length of traverse, 12".

Greatest distance between tool and table, 10".

Driving pulleys on countershaft, 8" for 2½" belt.

Cone pulley, three step, 4¾", 6½", 8" for 2" belt.

Countershaft, revolutions per minute, 100.

Size of swivel chuck, 8" long, 5½" between jaws, 1¼" deep.

Weight, 750 lbs.

Boxed for export, 51½" x 28½" x 31½", 925 lbs.

Floor space required, 27" x 27"

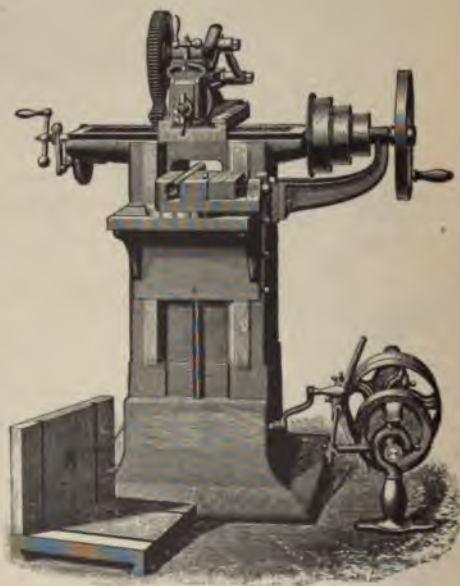


FIG. 11199.

NO. 1 TRAVERSE HEAD SHAPER.

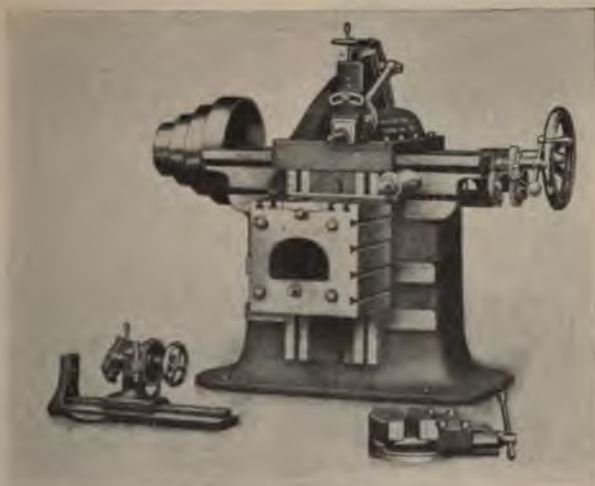


FIG. 11200.

DESCRIPTION FIG. 11200.

The accompanying illustration represents our No. 1 shaping machine which has a stroke from 0 to 14". The cutter bar is 30" long and has a bearing 25½" x 7½"; the saddle has a cross movement of 28". The bed on top is 44" long and 17½" wide.

This shaper has the Whitworth quick return; the forward movement of cutter bar takes about two-thirds of the crank movement and only one-third for the return.

Connecting rod made of steel; bearings at each end are provided with hardened steel split bushings adjustable for wear.

The table is 14" x 16½" and forms an angle iron 16½" x 10"; it has a vertical movement by means of worms and gear of 14¼"; distance from top of table, when at its lowest point, to cutter bar 17".

A cone mandrel is provided with independent, automatic, circular feed; this mandrel is so arranged that it can remain a permanent fixture, or can be quickly removed if desired; the feed can be connected and adjusted almost instantly.

A hole through bed admits a 3" shaft for slotting. The head has a vertical movement of 4¼" and is provided with a micrometer attachment on feed screw reading to thousandths of an inch; the head is graduated and can be set at any angle desired. Cone has four changes, largest diameter 18", smallest diameter 9", face 3¼".

Furnished with chuck and centers; the centers swing 11" and take in work 12" long. All sliding surfaces are scraped to a bearing and all shafts and screws are made of steel. Countershaft has tight and loose pulleys 16" x 4¼", and should make 120 revolutions per minute. Weight, 3,000 lbs.

SHAPER CENTERS.



FIG. 11201.

DESCRIPTION FIG. 11201.

Fig. 11201 represents our index centers, of which we make four sizes. They can be used on shaper, planer, or milling machine. The dials are drilled accurately with 24°, 28°, 30° and 36° holes.

Size.	For Size Shaper Diameter.	Swings	Takes in between Cores.	Length over all.	Weight, about.
1.....	14"	6"	12"	20½"	62 lbs.
2.....	16", 20"	7"	14½"	25"	105 lbs.
3.....	24"	10"	16"	30"	145 lbs.
4.....	34"	15"	20"	42"	325 lbs.

SHAPER VISES.

DESCRIPTION FIG. 11202.

Recognizing the wants of the market for a solid shaper vise suitable for heavier classes of shapers, and one that can be swung around at any horizontal angle and rigidly held against the strain of the cut, we designed the "Perfected Vise."

These vises have given the highest satisfaction, and our customers have written in the best of terms concerning their merits.

All of our vises have a place cast on the end of the ways for the workman to "strike" when lining up his work. This provides a place for final adjustment, and avoids bruises and hammer marks on the finished ways, which would in a very short time ruin the efficiency of the vise and cause inaccurate work.

Vise is held firmly to top of table by three bolts, triangularly placed, so that it will not swivel under a cut. It has a circular graduated index and can be swiveled and held at any horizontal angle.

The vise jaws project outside to hold long or short work, to plane off the ends of punches, rods, etc.

The ways of the vise have T cores cast within (our innovation). This furnishes additional means for strapping some classes of work to the body of the vise. The vise is provided with means for holding the loose jaw, as well as the work, down solid to the body of the vise.



FIG. 11202.

For Machine Size.	Takes between Jaws.	Width Jaws.	Height Jaws.	Weight, about.
14".....	10"	10"	2½"	90 lbs.
16" and 20".....	14½"	12"	2½"	135 lbs.
24".....	16"	14"	3"	260 lbs.
34".....	21"	19"	5"	500 lbs.

HIGH JAWED SHAPER VISES.

DESCRIPTION FIG. 11203.

Is largely used by mold makers. The jaws are made of extra height for holding deep work.

If ordered specially, any of our perfected vises are made with the high jaws at a slight advance in price.



FIG. 11203.

For Machine Size.	Takes between Jaws.	Width Jaws.	Height Jaws.	Weight, about.
16" and 20".....	14½"	12"	4"	150 lbs.
24".....	16"	14"	4½"	320 lbs.

SLOTING MACHINES.

DESCRIPTION FIGS. 11204 TO 11207.

Recently redesigned our slotting machines and have increased the stroke from 4" to 8" to the back of the uprights, making them 40 per cent. heavier and increasing the rigidity of the

4" and 10" slotting machines have no adjustment for slide, as it would not increase the value of the tool on a slotting machine. Above the 10" slotting machine cutting-bar slide is made adjustable on the outside and by making the cutting-bar slide very heavy, so that point the cutting-bar slide is set, it will be very easy to adjust the cutting-bar slide, it is only necessary to loosen the driving cone the slide can be adjusted in position to bring it down close to the work.



14" SLOTTER

FIG. 11204.

MOTOR DRIVEN SLOTTER.

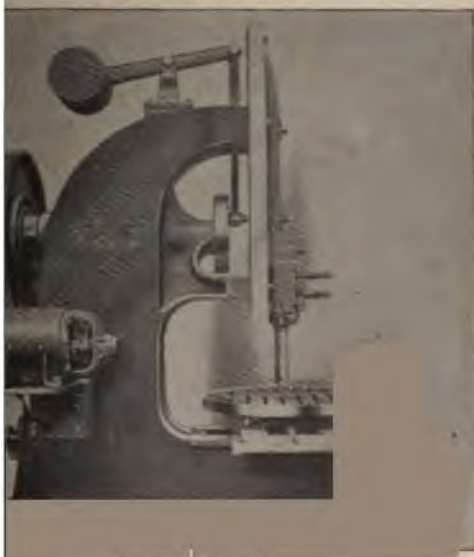


FIG. 11205.

The circular carriage has a full bearing on the lower saddle, the worm wheel being set in the saddle. The T slots for clamping work have ample metal over wing of slot, so they cannot break out when drawing bolts tight.

The crank plate is driven with Whitworth's quick return motion, with exception of sizes above 20"

All machines above 20" stroke are driven through a train of spur gearing by two belts separately shifted, or by the use of pneumatic clutches, and owing to its long projection the cutter bar is supported in a movable bearing. Carriages of these machines have power quick movements in all directions.

For specifications see following page.

SLOTTING MACHINES.



20" SLOTTER.

FIG. 11206.

For general description see preceding page.



60" SLOTTER.

FIG. 11207.

Rated size of machine.....	6"	8"	10"	12"	14"	16"	18"	20"	25"	32"	40"	50"
Maximum stroke of machine.....	6½"	8½"	10½"	12½"	14½"	16½"	18½"	20½"	26"	33"	41"	51"
In and out adjustment.....	10½"	11½"	16½"	22½"	28"	29½"	31"	33½"	35"	40"	45"	50"
Cross adjustment.....	14"	12"	13¼"	14"	16"	21"	24"	28"	35"	40"	45"	50"
Diameter of circular carriage over T slots.....	17½"	19½"	22"	25½"	30"	32"	34"	38"	42"	48"	48"	52"
Diameter of circular carriage over all.....	22¾"	24½"	27¼"	31"	36"	39"	41"	46¼"	48"	54"	56"	60"
Distance from face of ram to frame.....	12"	15½"	21½"	27"	29½"	31½"	33½"	37½"	32"	36"	40"	45"
Will admit work in height.....	10¼"	11¾"	13"	13"	19¾"	22½"	25"	26"	30"	34"	38"	44"

PORTABLE SLOTTING MACHINES.

DESCRIPTION FIG. 11208.

36", 48" AND 60".

These machines can be used on very heavy work, beyond the range of the regular run of slotting and planing machines. These slotting machines can be clamped in any position on a base plate to suit the work, and are especially adapted for the electric manufacturers on their dynamo frames and rings, and can be used to advantage in the manufacture of large engines. Machines can also be made up a sub-base, giving an adjustment to the entire upright without unclamping it, at an additional price.

SPECIFICATIONS.

Stroke of ram.....	36"	48"	60"
Cross feed to tool slide.....	28"	30"	38"
In and out adjustment of tool post.....	3"	4"	4"

72", 84" AND 96".

The rams of these three larger sizes of our portable slotting machines are driven with a screw in place of the rack and spiral pinion. The driving gear on top of machine is provided with a safety clutch, which is operated by a lever and rod, and is fitted with stops which can be set in position to throw out the clutch and prevent head from running off the ways in case of accident. When belt drive the motor is placed inside of upright.

SPECIFICATIONS.

Maximum stroke of machine.....	72"	84"	96"
Automatic cross feed to tool slide.....	48"	48"	48"
In and out adjustment to post.....	4"	4"	4"
Cross adjustment of upright when mounted on sub-base.....	48"	45"	45"

Photographs and complete specifications will be sent upon application.

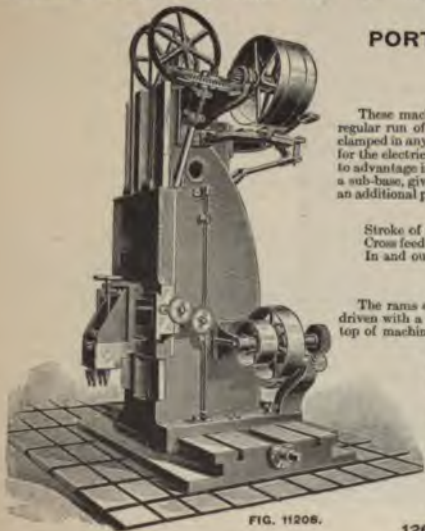


FIG. 11208.

THE FAIRBANKS COMPANY

DIE SLOTTING MACHINE.

DESCRIPTION FIG. 11209.

This tool is well adapted to all die work, small style, both straight and taper; also internal or external gear patterns, where draught is required, and all that class of common slotting. The two cross motions and the rotary table provide for following any outline.

The handle for the rotary table is arranged for using dials for dividing purposes, but for small divisions and rapid work it may be entirely removed, and the table revolved by hand, using the lock pin device, which provides twelve divisions for square, hexagon, octagon, duodecagon, etc.

The stroke of the machine has been fixed at $2\frac{1}{2}$ " which is ample for this class of work for which the machine is intended, and affords greater strength than an adjustable pin.

The speed can be changed by means of the cone pulley.

The slide for the ram can be swiveled 5° either way and set by a graduated index, thereby insuring the same draught to every part of the die. The tool block is well adapted for holding special tools. It swivels in a center near its lower end, and at the upper end, carried in a yoke, are two hardened plugs which bear on a cam that is bushed into the lower end of the connecting rod and from it derives a partially rotary motion, thus locking the tool block on the down stroke and causing the tool to clear on the up stroke. Equipment: 5 wrenches; 1 plain counter.

SPECIFICATIONS.

Diameter of circular table.....	12"
Vertical adjustment to table.....	15"
Adjustment in line with spindle.....	7 $\frac{1}{2}$ "
Adjustment across line of spindle.....	7"
Largest diameter of cone.....	10"
Width of belt required.....	2 $\frac{1}{2}$ "
Proportion of back gearing.....	5 to 1
Front spindle bearing.....	1 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ "
Size of tool used.....	1" x $\frac{1}{2}$ "
Strokes of slide.....	2 $\frac{1}{2}$ "
Column face to tool center.....	9 $\frac{1}{4}$ "
Tight and loose pulleys on countershaft.....	10" x 3"
Speed of countershaft, revolutions.....	225
Floor space required.....	29" x 44"
Domestic weight.....	1,130 lbs.
Foreign shipment, tight boxed (46 c. l.) weight.....	1,450 lbs.



FIG. 11209.

No. 2 IMPROVED KEYSEATER.

DESCRIPTION FIG. 11210.

The accompanying cut shows our new machine for light work, which is now a geared machine. This machine will cut from $\frac{1}{4}$ " to $\frac{1}{2}$ " key seats in all ordinary work, and do it quickly and accurately. The feed has automatic relief, which prevents all breaking of cutters. This machine will cut from 20 to 60 key seats per hour on ordinary work, and is intended for all kinds of internal key seating within its range. The depth and taper of the key seats are measured accurately by scales and pointer, and any number of key seats can be cut of any depth and taper required, and all will be uniform. Tight and loose pulleys, 14" x 3 $\frac{1}{2}$ ", should make 120 revolutions per minute. When ordering machine specify size of cutters wanted. No cutters are included with the machine. Weight, 400 lbs.

Cutters can be furnished in the following sizes:

$\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", $1\frac{1}{2}$ ", $\frac{3}{4}$ " and $\frac{1}{2}$ ".



FIG. 11210.

NO. 1 IMPROVED KEYSEATER.

DESCRIPTION FIG. 1121.

The accompanying cut shows our new improved No. 1 key seating machine, which will cut seats from $\frac{1}{8}$ " to 1". The machine is complete with heavy clamping bar for large work, also special clamping lever for small work. The machine will do all work accurately and quickly; the feed has automatic relief, which prevents the breaking of cutters, and is intended for all machine shops having internal key seating to do. The work can be placed in this machine and finished in the time other machines are being made ready. The depth and taper of key seats are measured accurately by scales and pointers, and any number of key seats can be cut of any depth and taper. The cross head has a side adjustment by which the cutter can be moved sideways so that the center of the cutter can at all times be made to cut in the center of the work, without moving the work on the table. We furnish one sample sleeve and holder, by which means the work is chucked by the hole in the work. Where a number of small pieces are to be cut this always insures cutting the key seat central, and in perfect alignment with the hole. Extra sleeves can be furnished for any size of hole, if desired, at a nominal cost, but the sleeve is simple to make, and can be made by any machinist for any special work they wish to use it for. The table and special attachment can be used on all machines made by us since 1882. Tight and loose pulleys, 14" x 4", should make 175 revolutions per minute. When ordering machine, specify size of cutters wanted. No cutters are included with machine. Weight, 800 lbs.

Cutters can be furnished in the following sizes: $\frac{1}{8}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", $\frac{15}{16}$ " and 1".

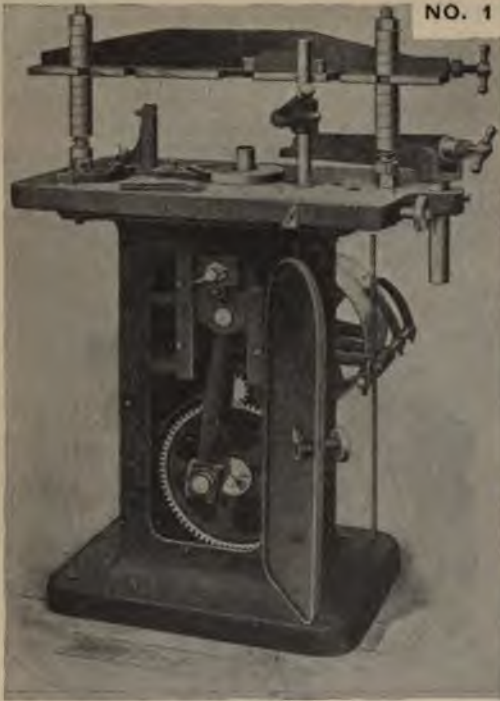


FIG 1121.

GIANT KEY-SEATERS.

DESCRIPTION FIGS. 11212 TO 11214.

The Giant keyseater is an entirely new departure in that line of machinery and is so plain and simple in its construction, that no extended description is needed beyond that afforded by the engravings, and especially by the outline drawing and description of the separate working parts.

The column and table are cast in one piece and the table is quite small, being seldom used. To hold large pulleys, no extension bars or outside supports are needed, as any piece requiring a key seat is supported solely by its hub.

A distinctive feature is the grooved post which holds the work and forms the guide for the tool. The use of this post solves the whole question of being able to obtain perfectly true, straight key ways, without regard to whether the hole is straight or taper, or whether the hub is faced true, or left rough as it comes from the foundry. Every job is quickly and accurately set and fastened by its bore only.

The great saving in money, represented by this feature alone, will soon pay for the machine.

In high grade machinery the hubs are usually faced true, but in many shops there is a large number of castings, such as sprocket wheels, gear wheels and other pieces, which do not need to have the hubs faced, except for the sake of having a true surface to work from, in cutting the key ways.

It usually requires from three to ten times as long to face off the hub as is required to cut the key seat.



FIG. 11212. SHOWS NO. 2 MACHINE AND COUNTERSHAFT.

GIANT KEYSEATERS.

DESCRIPTION FIGS. 11212 TO 11214.—Continued.

A key seat 6" long, 1/2" wide, and 1/8" deep, can be cut in two minutes, which includes time of putting on and taking from the machine. Another 11" long, 1/2" wide and 3/8" deep in three minutes, without any special effort for haste. Thirteen key seats, 1/2" wide, some straight and others taper, in pieces of different sizes and shapes, were cut in forty minutes. This shows how rapidly miscellaneous work can be done which requires various adjustments of the machine. Cutting key seats in tool steel milling cutters, fifteen pieces 3/4" thick were finished in three minutes, and six pieces 1" thick in five minutes.

The gear wheels used on the machines are key seated in less than two minutes, the actual cutting occupying only one minute, and less than one minute is required to remove one wheel and put on another.

The quickness with which this machine can be adjusted for different requirements leaves nothing to be desired.

The Giant will finish two ordinary key seats before one piece can be fastened, ready for key seating, on other styles of machines.

For key seating hard steel hubs the machine is well adapted, as it is impossible for the cutter to spring back, no matter how hard the material to be cut may be.

The machines may be fitted to cut key seats in holes from 1/2" diameter up to the largest size needed, and it is possible for the largest machine to operate in very small and long holes.

Each machine, however, will be furnished with only such cutters as each customer may order; for instance, one No. 2 machine was shipped with only two cutters, while another had eleven cutters, the largest being only 1/2" wide. The prices, of course, vary with the requirements.

MACHINE NO. 4.

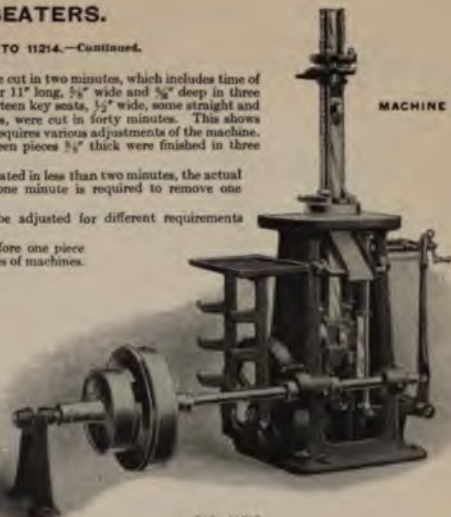


FIG. 11213.

SPECIFICATIONS FIGS. 11212 TO 11214.

	No. 0.	No. 2.	No. 3.	No. 3A.	No. 4.	No. 5.	No. 6.
Size of machine.....	No. 0.	No. 2.	No. 3.	No. 3A.	No. 4.	No. 5.	No. 6.
Maximum stroke.....	7"	13"	16"	25"	19"	25"	31"
Will key seat in width..	1/4"	1 1/4"	2"	2"	2 1/2"	3 1/2"	4"
Will carry posts.....	1 1/2" to 1 1/2"	1 1/2" to 2 1/2"	1 1/2" to 3 1/2"	1 1/2" to 3 1/2"	1 1/2" to 3 1/2"	1 1/2" to 4 1/2"	1 1/2" to 4 1/2"
Countershaft pulley....	18" x 3"	10" x 3"	10" x 3"	10" x 3"	10" x 3"	14" x 5"	14" x 5"
Speed of countershaft, revolutions per min.....	50	300	280	280	300	300	300
Weight.....	650 lbs.	1,500 lbs.	1,900 lbs.	2,000 lbs.	2,100 lbs.	4,300 lbs.	4,800 lbs.

Parties ordering should always state the diameter of the largest wheel to be key seated, so that the driving pulley and vertical belt may be set far enough from the machine. If the countershaft is placed on or below the floor the shaft of the machine will be made as short as possible. Unless otherwise ordered, the driving pulley and belt will be put at the following distances from the center of machine: No. 0, 22"; No. 2, 25"; No. 3, 31"; No. 4, 37"; No. 5, and 6, 29". Always state the diameter of the holes that are most often key seated so that the pair of step bushings which we furnish with each post may be of the required sizes. Each bushing can be made to take five to seven sizes, and extra ones can be furnished at moderate cost.

If key seats of more than one taper are required, extra charge will be made for the additional wedges furnished. When ordering extra cutters always state the width of cutter, diameter of post, and number or stroke of machine. To the price of the machine must be added the prices of such parts as the purchaser may select from the following: Countershaft, key vis, 11" or 15" long, automatic power feed attachment, posts and cutters.

NO. 6 MACHINE, MOTOR DRIVEN.

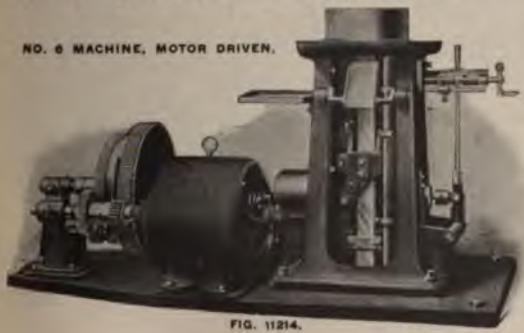


FIG. 11214.

Diameter of Post.	Length of Key way which may be cut.	Size of Cutters Generally furnished in each Post.	
		Width	Depth
3/4"	8	1/2"	1/8"
1"	9	5/8"	1/8"
1 1/4"	9	3/4"	1/8"
1 1/2"	11	7/8"	1/8"
1 3/4"	12	1"	1/8"
2"	15	1 1/4"	1/8"
2 1/4"	15	1 1/2"	1/8"
2 3/4"	18	1 3/4"	1/8"
3"	18	1 3/4"	1/8"
3 1/2"	24	1 3/4"	1/8"
4 1/2"	30	1 3/4"	1/8"
5 1/2"	30	1 3/4"	1/8"
6"	30	1 3/4"	1/8"

* The 1/2" post is too small to admit a separate taper wedge, so that one post is made to cut taper key seats and another to cut straight ones.

All posts will be fitted to cut a taper of 1/4" per foot unless otherwise ordered.

COLBURN KEYSEATERS.

NO. 0 MACHINE.

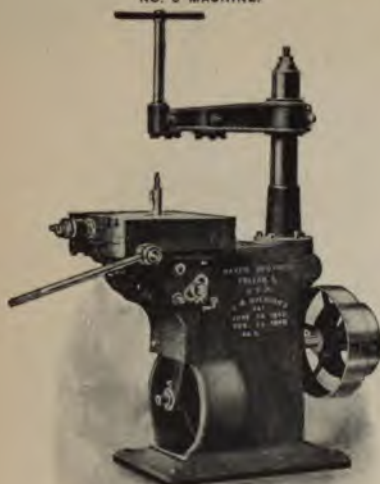


FIG. 11215.

LIST OF PARTS REGULARLY SHIPPED WITH THE COLBURN KEYSEATERS WHEN ORDERED WITH STANDARD OUTFITS.

NOS. 00 AND 0 MACHINES.

- 1 No. 00 or 0 keyseater with all necessary wrenches.
- 1 countershaft (for No. 0 machine only).
- 1 flat centering plate for centering bushings.
- 1 V shape centering plate for centering work by the outside.
- 3 short centering bushings as follows: $1\frac{1}{8}$ ", $1\frac{3}{8}$ ", and $2\frac{1}{2}$ ", unless otherwise specified.
- 1 short clamping bar for holding work to table.
- 1 long clamping bar for holding work to table.
- 1 pair clamping bolts.
- 2 cutter bars of any of the following sizes: $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", 1" and $1\frac{1}{2}$ " diameter, with guide bars, hand lever and upper and lower bushings to match. If not specified, $\frac{5}{8}$ " and $1\frac{1}{2}$ " bars will be sent.
- 4 cutters, any width, for any of the above bars. But unless otherwise specified, $\frac{3}{8}$ " and $\frac{1}{2}$ " cutters for $\frac{5}{8}$ " bar; and $\frac{5}{8}$ " and $\frac{3}{4}$ " cutters for $1\frac{1}{2}$ " bar will be sent.

NOS. 1 AND 2 MACHINES.

- 1 No. 1 or 2 keyseater with all necessary wrenches.
- 1 countershaft.
- 1 flat centering plate for centering bushings.
- 1 V shape centering plate for centering work by the outside.
- 3 short centering bushings as follows: $1\frac{1}{8}$ ", $1\frac{3}{8}$ ", and $2\frac{1}{2}$ " diameters, unless otherwise specified.
- 1 clamping bar for holding work to table.
- 1 pair clamping bolts.
- 3 cutter bars of any of the following sizes: $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ ", and $1\frac{3}{4}$ " diameter, with guide bars, hand levers and upper and lower bushings to match. If not specified, 1", $1\frac{1}{2}$ ", and $1\frac{3}{4}$ " bars will be sent.
- 10 cutters, any width, for any of the above bars. But unless otherwise specified, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{1}{2}$ " cutters for the 1" bar; $\frac{1}{2}$ ", $\frac{3}{8}$ ", and $\frac{3}{8}$ " cutters for the $1\frac{1}{2}$ " bar; and $\frac{3}{4}$ ", $\frac{1}{2}$ " and 1" cutters for the $1\frac{3}{4}$ " bar will be sent.
- 1 pair extension arms for supporting work of large diameter.

DESCRIPTION FIGS. 11215 TO 11217.

It may appear to the casual observer that the upper arm and column are objectionable on account of limiting the range of work to be key seated. The fact is, the upper arm and column are very essential features and not at all objectionable, as we can prove. In the first place, the distance from the cutter bar to the column in every one of our keyseaters is sufficient to chuck 99 per cent. of the average work within the range of the machine without moving the column at all.

By comparing the dimensions given in the specifications of the different machines on the next page, it can be seen how great a range each machine really has.

When the work is of such diameter that it becomes necessary to move the column, the change only takes a few minutes.

The advantages of the upper support for the cutter bar are so self-evident that little need be said in regard to same.

It insures a rigid support for the cutter bar, making it impossible for the cutter to spring away from the work either backwards or sideways.

The cutter bar always sets true with the table and cannot get out of line. Although we ordinarily chuck the work by the bore with special bushings, no universal system of bushings can be devised which are adequate for all the work required to be done on this machine. For instance a piece of work of irregular shape may need to be key seated either on the inside or outside. Frequently there are pieces requiring slotting either internally or externally. Many times there will be a job of key seating for which you will have no bushings. All such work can be quickly and accurately clamped on the table of our machine without any fixtures at all and the job finished while you would be looking around for the fixtures on other machines.

It must be evident to any one that this feature of our keyseater makes it a most valuable tool in a jobbing shop where the work is continually changing.

NO. 1 MACHINE.

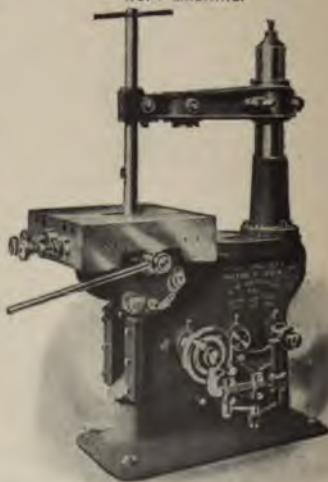


FIG. 11216.

COLBURN KEYSEATERS.

DESCRIPTION FIGS. 11215 TO 11217.—Continued.

NO. 3 KEYSEATER.

- 1 No. 3 keyseater complete with all necessary wrenches.
- 1 countershaft.
- 1 flat centering plate for centering bushings.
- 3 short centering bushings for centering work by the bore that is faced on hubs. Unless otherwise specified, 2½", 2¾" and 3¼" bushings will be sent.
- 1 V shape centering plate for centering finished work by the outside.
- One clamping bar for holding work to table.
- 1 pair clamping bolts.
- 4 cutter bars of the following sizes: 1", 1½", 1¾", and 2½" with bushings for run and upper arm and cutter bar guide shoes to match.
- 10 cutters, assorted sizes, for any of the above bars. But unless otherwise specified, ¼" and ⅜" for 1" bar; ⅝" and ¾" for 1½" bar; ⅞", ⅝", and 1" for 1¾" bar; 1¼", 1½", and 1¾" for 2½" bar will be sent.
- 1 pair of extension arms for supporting work of large diameter.

NOS. 3V, 4 AND 5 KEYSEATERS.

- 1 keyseater complete with all necessary wrenches.
- 1 countershaft.
- 1 flat centering plate for centering bushings.
- 1 reducing plate for holding small centering bushings.
- 3 short centering bushings for holding work by the bore that is faced on hubs. Unless otherwise specified 3½", 4¾", and 5¾" bushings will be sent.
- 1 V shape centering plate for centering finished work by the outside.
- 1 clamping bar for holding work to table.
- 1 pair clamping bolts.
- 4 cutter bars of the following sizes: 1½", 1¾", 2½", and 3½" with bushings for run and upper arm and cutter bar guide shoes to match.
- 10 cutters, assorted sizes, for any of the above bars. But unless otherwise specified, ½" and ⅝" for 1½" bar; ¾", ⅞" and 1" for 1¾" bar; 1¼" and 1½" for 2½" bar; 1¾", 2" and 2¼" for 3½" bar will be sent.
- 1 pair of extension arms for supporting work of large diameter.

NOS. 3, 3V, 4 AND 5 MACHINES.



FIG. 11217.

SPECIFICATIONS.

SIZE OF MACHINE	No. 00.	No. 0.	No. 1.	No. 2.	No. 3.	No. 3V.	No. 4.	No. 5.
Weight complete	975 lbs.	1,200 lbs.	2,400 lbs.	3,200 lbs.	6,500 lbs.	8,500 lbs.	10,000 lbs.	12,000 lbs.
Extreme length of stroke	8"	10"	11"	30½"	30"	20"	32"	38"
Working length of cutter	7"	9"	12"	18"	24"	24"	30"	36"
Distance from cutter bar to column in outside position	15½"	18"	21"	24"	30"	44½"	44½"	44½"
Length of table	16"	17"	21"	24"	30"	30"	30"	30"
Width of table	10"	18"	21"	24"	32"	30"	36"	36"
Longitudinal movement of table	4½"	4½"	4½"	5"	4½"	5"	5"	5"
Diameter of column	3½"	4"	4½"	6"	6"	8"	8"	8"
Floor space required	20" x 45"	20" x 50"	35" x 45"	30" x 52"	45" x 70"	55" x 74"	55" x 74"	55" x 74"
Speed of countershaft, revolutions per minute	*	†	180	170	200	200	200	200
Tight and loose pulleys on countershaft	*	†	16" x 5"	16" x 6"	16" x 6"	16" x 6"	16" x 6"	16" x 6"
Outch pulleys on machine, driving pulley	*	†	16" x 4½"	20" x 4½"	20" x 4½"	20" x 4½"	20" x 4½"	20" x 4½"
Reverse pulley	*	†	12" x 4½"	14" x 4½"	14" x 4½"	14" x 4½"	14" x 4½"	14" x 4½"

* No. 00 has driving pulleys 18" x 4" and 12" x 4" on the machine, which should run 75 revolutions per minute and 168 revolutions per minute respectively.

† No. 0 has driving pulleys 16" x 4" and 12" x 4" on the machine.

Note—Any part of the standard equipment can be omitted and allowance will be made for same in the price. When machines are required for special work, it is frequently desirable to have them supplied with special equipment, and this can usually be obtained.

No. 1 PORTABLE SHAFT KEYSEATER.

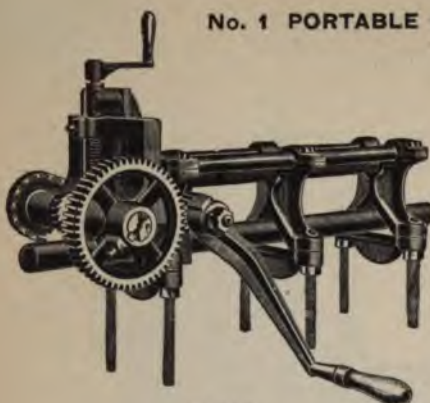


FIG. 11218.

DESCRIPTION FIG. 11218.

A set of five milling cutters, made from special steel, is furnished with each machine; by using one or more of which on the spindle, key seats of any of the following sizes may be milled full width at one operation:

$\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ " $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $1\frac{1}{8}$ " and $1\frac{1}{4}$ ".

Capacity: To mill key seats in shafts up to 5" in diameter; to mill 12" without resetting; to mill from $\frac{3}{4}$ " to $1\frac{1}{4}$ " wide.

Construction: Main head and arbor side milled and scraped; slide gibbed to main head with adjustable gib; automatic and hand feed; depth gauge; cut gears; large steel arbor; disengaging steel feed worm; steel lead screw; quick hand return for resetting; five special cutters.

Weight: Net, 75 lbs.; boxed for export, about 100 lbs.; size box for export, 12" x 12" x 28".

No. 2 PORTABLE SHAFT KEYSEATER.

DESCRIPTION FIG. 11219.

A set of five milling cutters, made from special steel, is furnished with each machine; by using one or more of which on the spindle, key seats of any of the following sizes may be milled full width at one operation:

$\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $1\frac{1}{8}$ " and $1\frac{1}{4}$ ".

Capacity: To mill key seats in shafts up to 8" in diameter; to mill 12" without resetting; to mill from $\frac{1}{4}$ " to 2" wide.

Construction: Main head and arbor slide milled and scraped; slide gibbed to main head with adjustable gib; automatic and hand feed; depth gauge; cut gears; large steel arbor; disengaging steel feed worm; steel lead screw; quick hand return for resetting; five special cutters.

Weight: Boxed, 250 lbs.; boxed for export, about 250 lbs.; size box for export, 13" x 15" x 30".

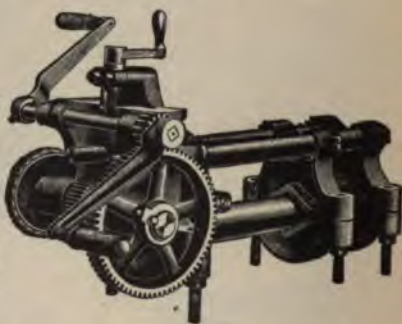


FIG. 11219.

THE LAKE PORTABLE KEYSEATERS.

DESCRIPTION FIG. 11220.

No. 1 machine will mill key seats in any size shafting from $\frac{3}{8}$ " to 4 $\frac{1}{2}$ " in diameter the following widths, $\frac{1}{4}$ " (by sixteenths) to and including $1\frac{1}{2}$ ". Weight, net, 45 lbs.; boxed, 70 lbs.; measurements, 12" x 12" x 22".

No. $1\frac{1}{2}$ machine, while it is designed especially for cutting key seats in loom and other machine shafts, where the shafting extends 3" or more through bearings, it will do all that the No. 1 machine will, besides it will cut key way to within 1" of the face of box. Weight, net, 65 lbs.; boxed, 90 lbs.; measurements, 12" x 12" x 22".

No. 2 machine will mill key seats in any size shafting from 2" to 8" in diameter the following widths, from $\frac{1}{4}$ " (by sixteenths) to $1\frac{1}{2}$ "; and from $1\frac{1}{8}$ " (by eighths) to 2". Weight, net, 80 lbs.; boxed, 113 lbs.; measurements, 12" x 13" x 24".

Pulleys for belt power can be furnished at extra cost.



FIG. 11220.

CONTINUOUS KEY WAY OR SPLINE CUTTER AND PORTABLE KEYSEATER.

DESCRIPTION FIG. 11221.

This illustration shows a combination of two very valuable labor saving machines, a portable keyseater in combination with a continuous key way or spline cutter. The advantages of this machine will be apparent to engineers, machine tool builders, millwrights, manufacturers and all others using shafting.

As a continuous key way or spline cutter it will mill accurately and in perfect alignment, any size key way or spline, from $\frac{1}{4}$ " by sixteenths to $1\frac{1}{2}$ " and from $1\frac{1}{8}$ " by eighths to 2", any depth not exceeding $\frac{3}{4}$ " at the rate of 1" per minute, any length required, and take any size shaft from $\frac{1}{4}$ " to 6" in diameter.

To use it as a portable keyseater, disconnect two bolts from the stand of the continuous key way cutter and apply yoke and crank and you have a No. 2 portable key seater, that will mill any size shafting from 2" to 8" in diameter the following widths, viz.: From $\frac{1}{8}$ " by sixteenths to $1\frac{1}{8}$ ", and from $1\frac{1}{8}$ " by eighths to 2", any depth not exceeding $\frac{3}{4}$ ", and this machine is provided with either automatic or hand feed while cutting, and has an indicator to show the depth cut in shaft. The machine will mill 6" before it is necessary to move the base forward on the shaft. An operator can easily cut a key seat 12" long by $\frac{1}{2}$ " wide, $\frac{1}{8}$ " deep in one hour by hand, and other sizes in proportion.

Weight, net 400 lbs.; loaded, 500 lbs.; measurements, 22" x 31" x 48".



FIG. 11221.

NO. 1 HAND BORE KEYSEATER.

DESCRIPTION FIG. 11222.

The engraving shows our improved hand bore keyseater for cutting straight and taper key ways up to $1\frac{1}{2}$ " wide in bores not over 12" long. It is designed for general machine and repair shop work and is adapted to cut key ways in work of any size, weight or shape. On heavy work it is advantageous to remove the machine from the pedestal and use it as a portable tool.

Work in all cases is chucked to the bore and hubs need not be faced. The method of chucking is extremely simple, suitable stirrups and binders being furnished with each cutter bar outfit. Key ways cut on this machine come central with the bore and are ready for keys.

The machine is well built throughout, the first pinion and rack being of machinery steel, and all gears have machine cut teeth. Its efficiency, general usefulness and ease of operation will commend it to any one having key ways to cut. It is offered at a price which places it within the reach of all.

The cutter bars used in this machine consist of the wedge bar, with its bearing strip always pressed firmly against the channel of the guide bush and carrying the feed wedge at its outer end; and the bit bar having the cutter fastened to its outer end. These two bars are fastened together at the inner, or tool post end, and the feed is obtained by inserting the feed wedge between them. It will be seen that the cutter has a solid backing at all times between the cutting edge and the channel of the guide bush, making any retreat of the cutter from the work impossible.

Cutter bars and cutters are extra. See Fig. 11223.



FIG. 11222.

CUTTER BARS FOR HAND BORE KEYSEATER.

DESCRIPTION FIG. 11223.

These bars are for use on machine shown in Fig. 11222 and are made in sizes as follows:

The $\frac{1}{2}$ " cutter bar which is furnished with one guide bush of any size desired from 1" to $1\frac{1}{2}$ " in diameter. The guide bushes for this bar must be the same size as the bore of the work to be key seated and are made regularly to cut key seats up to 6" long. The $\frac{1}{2}$ " bar is used for key ways from $\frac{1}{4}$ " to $\frac{3}{8}$ " wide.

The $\frac{3}{4}$ " cutter bar which is furnished with a guide bush $1\frac{1}{8}$ " in diameter, adapted to straight and taper key ways in bores of its diameter and larger, not over 12" long, and with which cutters from $\frac{1}{2}$ " to $\frac{3}{4}$ " wide may be used.

The $1\frac{1}{2}$ " cutter bar which is furnished with a guide bush $3\frac{1}{8}$ " in diameter adapted to straight and taper work in all bores of its diameter, or larger, not over 12" long, and with which cutters from $\frac{3}{4}$ " to $1\frac{1}{2}$ " wide may be used.

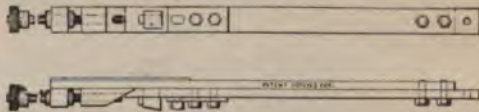


FIG. 11223.

IMPROVED KEY SEAT MILLING MACHINE.

NO. 1 KEY SEAT MILLING MACHINE.

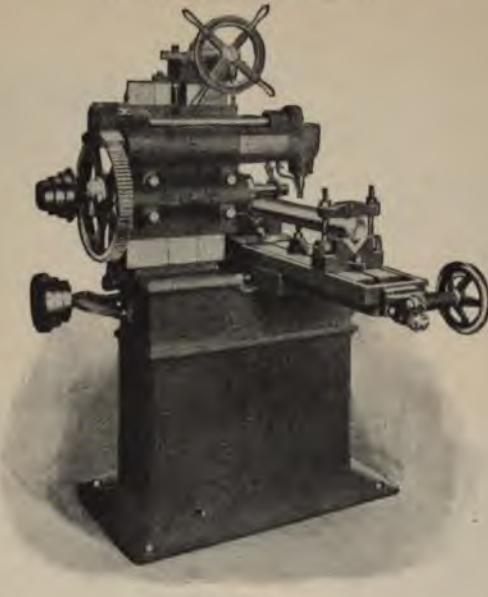


FIG. 11224.

DESCRIPTION FIG. 11224.

For rapidly milling key seats for "feather keys," short "splines" and other work requiring one or both ends rounded up this machine will be found invaluable. The carriage has automatic feed with automatic stop, and is fitted with V blocks having false piece for small shafts; one V block is mounted on taper base to accommodate varying diameters in the shafts. Horizontal cutters of the correct width with accompanying washer, brings the cutter in exact central position over V block when the carriage is moved over against the inner stops. The depth of cut is regulated with a micrometer on adjusting hand wheel. After key way is milled to the required length, the carriage is moved back against another set of stops, which brings end milling cutter in vertical spindle in alignment with key seat, and end is rounded up. No setting of work beyond placing of shaft in V block is required, and a perfectly finished key seat is obtained. This does away with the use of the expensive and slow cutter drill, and the older method of planing key ways and chipping the end into shape, as the full width and depth of key way is cut at one time by horizontal spindle; vertical spindle with end mill is used only to remove the stock at end left by horizontal cutter.

Illustration shows machine set for taking cut with horizontal spindle. Spindle heads are counterweighted and have micrometer for accurate adjustment to depth. Work requires no setting.

SPECIFICATIONS.

NO. 1 MACHINE.

Maximum diameter of shafts.....	4"
Length of carriage over all.....	44"
Length of automatic feed to carriage.....	24"
Cutters and washers furnished for key seats in width: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and $\frac{1}{2}$ ".	

NO. 2 MACHINE.

Maximum diameter of shafts.....	8"
Length of carriage over all.....	60"
Length of automatic feed to carriage.....	30"
Cutters and washers furnished for key seats in width: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", and $1\frac{1}{4}$ ".	
On both sides, the supporting arm for vertical spindle is used as a reservoir for lubricant.	

NO. 5 KEY SEAT MILLING MACHINE.

DESCRIPTION FIGS. 11225 AND 11226

REGULAR MACHINE.

The engravings show our No. 5 key seat milling machine, both with and without routing attachment, representing a distinct advance in its class. It is of the double housing, planer type, is heavy, well built and powerful, and is adapted to a large variety of milling other than key seating. The double housing bolted to the bed with drive bolts, and the saddle covering its whole width and substantially gibbed to it, presents the stiffest possible arrangement for resisting the heavy strains incident to high speeds and fast speeds. The routing attachment spindle has independent vertical adjustment, and when not in use it may be raised so as to in no way interfere with the operation of the horizontal spindle. In addition to these features, however, there are many points of merit, adding considerably to its convenience and capacity as a rapid producer of first class work, to which attention is called.

The routing attachment has independent vertical and horizontal adjustments, and is driven from the main driving gear as shown. The operation of routing out the ends of key seats is performed immediately after they are milled, without disturbing the horizontal adjustment of either cutter, or unclutching the shaft. The main slide is simply lifted until the horizontal cutter clears the shaft, the router spindle is lowered with its own adjustment until the end mill bottoms, and first one end, then the other, of the key seat is routed. The attachment, if not in constant use, may be removed from the machine with very little effort. Its use greatly simplifies the production of key seats for leathers or drop keys, over any other method.

The platen is 9" wide, very heavy, and is regularly furnished 48" long, between the pockets. It is made with three T slots, proper oil channels, and is piped between the pockets so that lubricant is at once returned to the reservoir in the base.

The spindle is 3" in diameter, of hammered crucible steel, and runs in boxes adjustable for wear. The cutter spindle is provided with a substantial outboard bearing, insuring absolute stiffness under the heaviest cuts. Cutters with 1½" hole, up to 5" diameter are used, sufficient cross adjustment being obtained by the use of an approved expansion collar.

The feed of the platen is automatic, full length of table, and is arranged to automatically trip at any point. Eight suitable changes are obtained for each (2) spindle speed. The worm wheels are each provided with clutches so that the worms are always in mesh, and a quick hand return to platen is provided by a suitable hand crank. By unclutching the rear worm wheel, a very fine hand feed is obtained through the hand wheel on the first feed spindle. This feed is of value in starting a key way, permitting the cutter to be sunk without starting the feed, and also as a sensitive feed when using small cutters in the routing attachment.

The drive is very powerful, through cut gears, the driving pulley being 14" diameter for 4" belt, and is so designed that the belt tension is the same for all positions of the slide.

MACHINE WITH ROUTING ATTACHMENT



FIG. 11226.

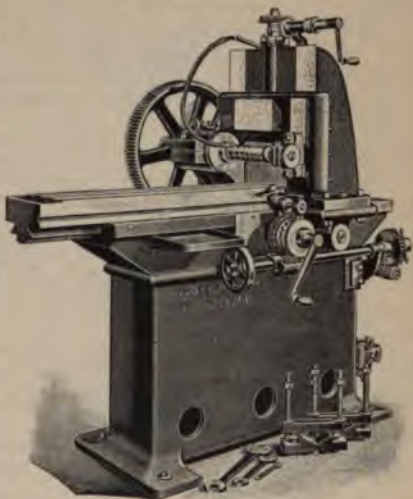


FIG. 11225.

The down feed for the main slide is conveniently located on the working side of the machine, is graduated to 1-64ths, and operates through a pair of cut bevel gears.

The oil pump, through suitable tubing, provides an abundance of lubricant, permitting fast operation without injuring the cutters. The flexible connection permits the lubricant to be used on either cutter.

The equipment furnished with each machine consists of two speed friction counter shaft oil pump, wrenches, a pair of V blocks, studs and binders.

- Platen 9" x 48", 60" and 72"; 3 T slots, oil channels and pockets.
- Automatic feed of 48", 60" and 72". Automatic, adjustable trip.
- Eight feed changes for each spindle speed.
- Spindle of crucible steel, 3" diameter
- Cutters with 1½" standard hole, up to 5" diameter, can be used.
- Greatest distance from center of spindle to platen 11½".
- Least distance from center of spindle to platen 1½".
- Will take through housing 10½" x 9½".
- Main driving gear 20" diameter x 2½" face, 6 pitch.
- Driving pulley 14" x 4½".
- Oil pump, piping, and flexible connection.
- Friction countershaft, allowing two changes of spindle speed.
- Router spindle has independent vertical adjustment of 3¼".
- Router spindle has independent horizontal adjustment of 3¼".
- Greatest distance from end of router spindle to platen 135".
- Least distance from end of router spindle to platen, 0.
- Router spindle has standard No. 7 flange - 3 1/2" hole.
- Weight of complete 48" machine
- Weight of 48" machine, without

104

BENCH DRILLS, NOS. 00, 0, 1; 10" AND 13".

DESCRIPTION FIGS. 11227 TO 11229.

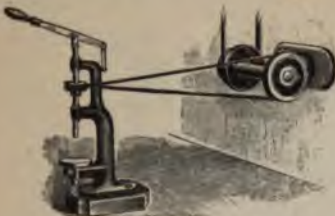


FIG. 11227. NO. 00 DRILL.

No. 00 drill is suitable for driving No. 40 gauge drills and smaller. Can be supplied with wall countershaft, or overhead countershaft as desired.

No. 0 drill is suitable for driving $\frac{3}{8}$ " drills and smaller, 9" swing, 8" from spindle to table, tight and loose pulleys for 1" belt are 4" diameter.

Two-speed cone for $\frac{3}{8}$ " round belt. Weight, 37 lbs. Column can be furnished if desired. Chuck shown in cut is supplied at extra cost only.

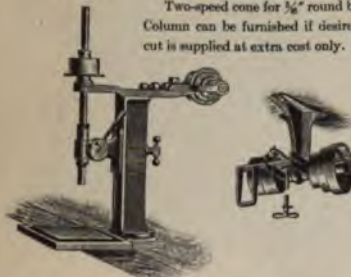


FIG. 11228. 10" AND 13" NO. 1 DRILLS WITH COUNTERSHAFT.



FIG. 11229. NO. 0 DRILL.

No. 1, 10" drill has table 10" x 11", spindle pulley $3\frac{1}{2}$ " x $1\frac{3}{8}$ ", countershaft with tight and loose pulleys 5" x $2\frac{3}{4}$ " to run 350 revolutions per minute, weighs 156 lbs. Spindle bored No. 1 Morse taper.

No. 1, 13" drill has table 11" x 11", spindle pulley 4" x $1\frac{3}{8}$ ", countershaft with tight and loose pulleys 5" x $2\frac{3}{4}$ " to run 350 revolutions per minute, weighs 166 lbs. Spindle bored No. 1 Morse taper.

10" SENSITIVE BENCH DRILL.

DESCRIPTION FIG. 11230.

In the manufacture of this machine the best of material and workmanship only enter into its construction. Both the quill and spindle are ground and this fact, together with the ball bearing thrust collar, double flanged upper cone and micrometer adjustment to the stop collar, are the special features. The taper on the spindle is made to fit a $\frac{3}{8}$ " Almond or Skinner chuck.

SPECIFICATIONS.

Greatest distance from spindle.....	7 $\frac{1}{2}$ "
Vertical movement of spindle.....	2 $\frac{1}{2}$ "
Vertical movement of table.....	7"
Diameter of table.....	8"
Distance from center of spindle to frame.....	5 $\frac{1}{4}$ "
Drilling capacity.....	0 to $\frac{3}{8}$ "
Diameter of tight and loose pulleys.....	1 $\frac{1}{2}$ " x 4"
Speed of driving pulley, revolutions.....	550
Weight of machine.....	46 lbs.
Weight of machine ready for shipment.....	75 lbs.

NOTE: Machine is built with swinging table as shown or with plain stationary table.



FIG. 11230.

**BENCH DRILL WITH
LEVER AND TREADLE
FEEDS.**



FIG. 11231.



FIG. 11233.

SENSITIVE DRILLS.

DESCRIPTION FIG. 11231.

This tool is put on the market with some special features to recommend it. It has large drilling capacity for a tool of this class, drilling $\frac{1}{2}$ " holes and under. It has the special feature of throwing the spindle its entire run of 5" by foot-lever. This leaves both hands free to hold the work. The hand-lever can also be used when wanted. Each drill is provided with a universal chuck that will hold $\frac{1}{2}$ " drills. The chuck tightens with a key, and the spindle does not have to be held in order to tighten the chuck.

The spindle pulley is 6" in diameter, 2" face, but larger or smaller pulleys can be fitted at option of the buyer; the cone pulleys are 4", 5 $\frac{1}{2}$ " and 7" diameter, 2" face; the pulley belting to spindle pulley is 7" diameter, 2" face; tight and loose pulleys on countershaft are 8" diameter, 2 $\frac{1}{2}$ " face; the cone on counter is same as cone on drill.

A complete countershaft goes with each drill.

The rack and pinion are cut from steel. It will drill to center of a 13" circle. The greatest distance from table to chuck is 8".

DESCRIPTION FIG. 11232.

This drill is the same as that shown in Fig. 11231, with the exception that the foot lever is omitted.

13" BENCH DRILL.



FIG. 11232.

13" DRILL.



NO. 1 SENSITIVE DRILLS.

DESCRIPTION FIGS. 11233 AND 11234.

Spindles are bored No. 1 Morse taper and are spring balanced. A tightener is provided for top and back belts. Spindle pulleys run on studs. Spindles, sleeves and shafts are ground to size and all running bearings are bushed.

SPECIFICATIONS.

Size of drill.....	10"	13"
Spindle to table.....	12"	12"
Spindle to sliding table.....	44"	44"
Spindle pulley.....	3 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ "	4" x 1 $\frac{1}{2}$ "
Tight and loose pulleys.....	4 $\frac{1}{4}$ " x 1 $\frac{1}{2}$ "	4 $\frac{1}{4}$ " x 1 $\frac{1}{4}$ "
Speed tight and loose pulleys, revolutions per minute....	400	350
Cone belt.....	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "
Weight, net.....	250 lbs.	290 lbs.
Weight, crated.....	285 lbs.	335 lbs.

SENSITIVE DRILLS.

13" DRILL.



FIG. 11235.

DESCRIPTION FIG. 11235.

Capacity, $1\frac{1}{2}$ " holes and smaller.

The spindle pulley is 6" in diameter, 2" face, but larger or smaller pulleys can be fitted at option of the buyer; the cone pulleys are 4", $5\frac{1}{2}$ " and 7" diameter, 2" face; the pulley belting to spindle pulley is 7" diameter, 2" face; tight and loose pulleys on countershaft are 8" diameter, $2\frac{1}{2}$ " face; the cone on counter is same as cone on drill.

A complete countershaft goes with each drill.

The rack and pinion are cut from steel. It will drill to center of a 13" circle. The greatest distance from table to chuck is 8".

NO. 2 SENSITIVE DRILL.
10" SWING.

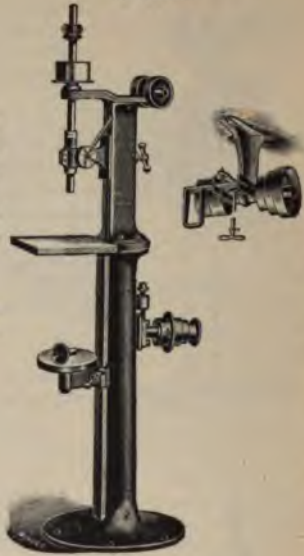


FIG. 11236.

NO. 2 SENSITIVE DRILLS.

DESCRIPTION FIGS. 11236 AND 11237.

Spindles, Morse taper No. 1, spring balanced; tightens for spindle belt, swing and sliding table, bell center, adjustable depth stop; spindle, sleeve and shafts ground to size, all running bearings lashed; end of spindle to table 12", to sliding table 44". Spindle pulley runs on stud.

10": spindle pulley, 4" diameter for $1\frac{1}{2}$ " belt; countershaft tight and loose pulleys 5" diameter by $2\frac{1}{4}$ " face, runs 350 revolutions per minute, three step cone for $1\frac{1}{2}$ " belt; weight 264 lbs. net, crated 300 lbs. 13": spindle pulley, $5\frac{1}{4}$ " diameter for $1\frac{1}{2}$ " belt; countershaft tight and loose, same as 10", 300 revolutions per minute, three step cone for $1\frac{1}{2}$ " belt; has steel rack in sleeve; weight, 306 lbs. net, crated 400 lbs.

NO. 2
SENSITIVE
DRILL.
10" SWING.

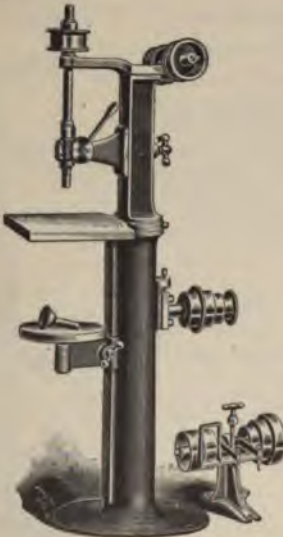


FIG. 11237.

13" SENSITIVE DRILL.



FIG. 11238.

SENSITIVE DRILLS.

DESCRIPTION FIG. 11238.

13" DRILL.

It has counterbalanced spindle, sliding head and ratchet lever feed. The table is vertically adjustable on column. The machine will drill holes up to $\frac{1}{2}$ " in diameter.

Distance from column to center of spindle, 61 $\frac{1}{2}$ ". Maximum distance, spindle to table, 36"; minimum, 0. Vertical adjustment of head, 13"; of table, 25". Traverse of spindle, 3 $\frac{1}{2}$ ". Diameter of spindle, $\frac{3}{4}$ ". Hole in spindle, Morse taper No. 1. Table, 11" square. Cone belt, 1 $\frac{1}{2}$ ". Driving pulleys, 5". Speed of countershaft, 350 revolutions per minute. Pulleys on spindle, 4". Height of machine, 6' 4". Floor space, 34" x 26". Weight, 275 lbs. Boxed weight, 380 lbs. 13 cubic feet.

DESCRIPTION FIG. 11239.

14" DRILL.

Distance, post to spindle center, 7"; minimum distance, spindle to table, 0; maximum, 32". Vertical adjustment of head, 7 $\frac{1}{2}$ "; of table, 32". Traverse of spindle, 3 $\frac{1}{2}$ ". Diameter of spindle, $\frac{3}{4}$ ". Hole in spindle, Morse taper No. 1. Table, 9" x 9". Cone belt, 1 $\frac{1}{2}$ ". Driving pulleys, 5" x 13 $\frac{1}{4}$ ". Speed of countershaft, 350 revolutions per minute. Pulley on spindle, 5" x 13 $\frac{1}{4}$ ". Height of machine, 70". Floor space, 34" x 14 $\frac{1}{2}$ ". Weight, 250 lbs. Boxed weight, 325 lbs. 8 cubic feet.

14" SENSITIVE DRILL.



FIG. 11239.

15" SENSITIVE DRILL WITH SLIDE TABLE.

DESCRIPTION FIG. 11240.

14" DRILL.

Distance from post to spindle center, 7 $\frac{3}{4}$ "; from spindle to square table (maximum), 12 $\frac{1}{2}$ "; (minimum), 0. To round table (maximum), 41"; (minimum), 5". Vertical adjustment of head, 7 $\frac{1}{2}$ "; of round table, 36". Traverse of spindle, 3 $\frac{1}{2}$ ". Diameter of spindle, $\frac{3}{4}$ ". Hole in spindle, Morse taper No. 1. Has graduated quill. Has steel rack. Table 11" x 11". Width of belt on cones, 1 $\frac{1}{2}$ ". Driving pulleys, 5" x 13 $\frac{1}{4}$ ". Pulley on spindle, 5" x 2". Total height of machine, 6' 5". Speed of countershaft, 400 revolutions per minute.

Floor space required, 22" x 28". Weight, 260 lbs. Boxed weight, 430 lbs. 15 cubic feet. Boxed weight, two in a box, 675 lbs. 21 cubic feet.

DESCRIPTION FIG. 11241.

15" DRILL.

Spindles, 1 $\frac{1}{8}$ " diameter Morse taper No. 2, spring balanced; tightener for top and back belts, adjustable depth stop; spindle, sleeve and shafts ground to size, all running bearings lathed; spindle pulley 4 $\frac{3}{4}$ " for 1 $\frac{1}{2}$ " belt, three step cones for 1 $\frac{1}{2}$ " belt; tight and loose pulleys 6" x 2 $\frac{1}{2}$ ", run 175 revolutions per minute.

Slide table: end of spindle to table 33 $\frac{1}{2}$ "; weight, net, 452 lbs., crated 510 lbs.

This drill is also built with swinging table similar to that shown in Fig. 11237.

14" SENSITIVE DRILL.



FIG. 11240.



16" SENSITIVE DRILL.



FIG. 11242.

SENSITIVE DRILLS.

DESCRIPTION FIG. 11242.

16" DRILL.

It has counterbalanced spindle, sliding head and ratchet lever feed. The table is vertically adjustable on column. Capacity of the machine is $\frac{1}{2}$ " holes. Countershaft accompanies machine.

Distance, post to center of table, 8". Distance, spindle to table, maximum, 28"; minimum, 0". Traverse of spindle, 4 $\frac{1}{2}$ ". Traverse of head, 11". Traverse of table, 17". Table, 14 $\frac{1}{2}$ " x 11 $\frac{1}{2}$ ". Diameter of spindle, 1 $\frac{1}{2}$ ". Hole in spindle, Morse taper No. 2. Width of belt on cones, 1 $\frac{1}{2}$ ". Driving pulleys, 6" x 2". Speed of countershaft, 350 revolutions per minute. Floor space, 29" x 20". Extreme height, 6'. Weight, 370 lbs. Boxed weight, 530 lbs. Cubic feet, 26.

DESCRIPTION FIG. 11243.

13" DRILL.

The table is 11" in diameter, and has an adjustment up and down of 5".

Net weight, 170 lbs.

Gross weight, 233 lbs.

Net weight, with floor column, 260 lbs.

Gross weight, with floor column, 415 lbs.

Chuck shown in cut holds drills up to $\frac{1}{2}$ " diameter.



13" SENSITIVE DRILL WITH TREADLE FEED.



FIG. 11243.

10" THREE-SPINDLE SENSITIVE DRILL.



FIG. 11244.

DESCRIPTION FIG. 11244.

10" DRILL.

This drill is built with two, three or four spindles, as desired.

End of spindle to table 12", center to center of spindles 6". All spindle pulleys 1 $\frac{1}{2}$ " face, three-step cones; countershaft, tight and loose pulleys, 8" x 2 $\frac{1}{4}$ ", run 300 revolutions per minute. Spindles have No. 1 Morse taper hole, depth stops, and are balanced by springs; spindles, sleeves, etc., are ground to size.

Two-spindle weighs, net, 377 lbs., crated 440 lbs.; spindle pulleys 4" and 4 $\frac{1}{4}$ " diameter.

Three-spindle weighs, net, 505 lbs.; crated 625 lbs.; spindle pulleys 4", 4 $\frac{1}{4}$ " and 5" diameter.

Four-spindle weighs, net, 575 lbs.; crated 710 lbs., spindle pulleys 3 $\frac{1}{4}$ ", 4", 4 $\frac{1}{4}$ " and 5 $\frac{1}{2}$ " diameter.

DESCRIPTION FIG. 11245.

13" DRILL.

Built with two, three or four spindles. Least distance end of spindle to table 4 $\frac{1}{2}$ ", greatest 40"; center to center of spindles 6", throw of spindle (regular) 3"; tables have oil grooves, spindles have No. 1 Morse taper hole, depth stops, and are balanced by spring. Spindles, sleeves, etc. ground to size.

Two-spindle weighs, net, 446 lbs., crated 500 lbs. Spindle pulleys, 4" and 4 $\frac{1}{4}$ " for 1 $\frac{1}{2}$ " belt; three-step cone for 2" belt, tight and loose pulleys, 8" x 2 $\frac{1}{4}$ ", run 250 revolutions per minute.

Three-spindle weighs, net, 585 lbs., crated 675 lbs. Spindle pulleys, 4", 4 $\frac{1}{4}$ ", and 5 $\frac{1}{2}$ " for 1 $\frac{1}{2}$ " belt; three-step cone for 2" belt, tight and loose pulleys, 8" x 2 $\frac{1}{4}$ ", run 250 revolutions per minute.

Four-spindle weighs, net, 670 lbs., crated 800 lbs. Spindle pulleys, 4", 4 $\frac{1}{4}$ ", 5 $\frac{1}{2}$ " and 6 $\frac{1}{2}$ " for 1 $\frac{1}{2}$ " belt; three-step cone for 2" belt, tight and loose pulleys, 8" x 2 $\frac{1}{4}$ ", run 250 revolutions per minute.

Countershaft included—spindle pulleys changed as desired.

13" TWO-SPINDLE SENSITIVE DRILL.



FIG. 11245.

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SENSITIVE DRILLS.

13" TWO-SPINDLE SENSITIVE DRILL.



FIG. 11246.

DESCRIPTION FIG. 11246.

Distance between spindles, $7\frac{1}{2}$ ". Distance, post to center of spindle, $6\frac{1}{2}$ ". Maximum distance, spindles to table, 36"; minimum, 0. Vertical adjustment of heads, 13"; of table, 24". Traverse of spindles, $3\frac{1}{2}$ ". Diameter of spindles, $\frac{3}{8}$ ". Holes in spindles, Morse taper No. 1. Table, $11" \times 18"$. Cone belt, $1\frac{1}{2}"$. Driving pulleys, $6" \times 2"$. Speed of countershaft, 350 revolutions per minute. Pulleys on spindles, $4" \times 1\frac{1}{2}"$. Height of machine, $6' 4"$. Floor space, $35" \times 27"$. Weight, 425 lbs. Boxed weight, 575 lbs. 18 cubic feet.

DESCRIPTION FIG. 11247.

Distance between spindles, $7\frac{3}{4}"$. Distance, post to center of spindle, $6\frac{1}{4}"$. Maximum distance, spindles to table, 36"; minimum, 0. Vertical adjustment of heads, 13"; of table, 24". Traverse of spindles, $3\frac{3}{4}"$. Diameter of spindles, $\frac{3}{8}"$. Holes in spindles, Morse taper No. 1. Table, $11" \times 26"$. Cone belt, $1\frac{1}{2}"$. Driving pulleys, $8" \times 2"$. Pulleys on spindles, $4" \times 1\frac{1}{2}"$. Height of machine, $6' 4"$. Floor space, $36" \times 26"$. Weight, 700 lbs. Boxed weight, 925 lbs. 25 cubic feet.

13" THREE-SPINDLE SENSITIVE DRILL.



FIG. 11247.

DESCRIPTION FIG. 11248.

Distance between spindles, $7\frac{1}{2}"$. Distance, post to center of spindle, $6\frac{1}{2}"$. Maximum distance, spindles to table, 36"; minimum, 0. Vertical adjustment of heads, 13"; of table, 24". Traverse of spindles, $3\frac{1}{2}"$. Diameter of spindles, $\frac{3}{8}"$. Holes in spindles, Morse taper No. 1. Table, $11" \times 33"$. Cone belt, $1\frac{1}{2}"$. Driving pulleys, $8" \times 2"$. Pulleys on spindles, $4" \times 1\frac{1}{2}"$. Height of machine, $6' 4"$. Floor space, $43" \times 29"$. Weight of machine, 925 lbs. Boxed weight, 1,140 lbs. 31 cubic feet.

DESCRIPTION FIG. 11249.

This drill is now made with sliding heads, which have an adjustment of 12". Prominent among the many strong features of this drill is the countershaft, independent of and belting to the base of the drill, thereby removing all jar or shaking caused by unevenness in the belt. This system of belting imparts a perfectly steady motion to the spindles, and the belts being long give great power, while running quite loose. The tension of the belt is never on the spindles. The quill has fixed rack and pinion. The spindles are made of the best crucible steel, and are reamed with Morse taper No. 1. The spindles are counterbalanced with a coil spring, which can be adjusted to any degree of sensitiveness. The spindles are 8" apart, and are driven by one endless belt 2" wide. Each spindle has an independent stop motion as shown on cut, which enables the operator to stop or start the spindles without stopping the machine. Stop collars for drilling to depths are furnished, also collars to stop the spindles from rising higher than necessary. The belt should be endless, and it can be taken on without lacing. The table is counterbalanced by weight inside of column. The table is provided with oil channel, and is free to swing either way.

Net weight, 800 lbs. Gross weight, 970 lbs.

Size of box, $75" \times 35" \times 29"$.

13" FOUR-SPINDLE SENSITIVE DRILL.



SPECIFICATIONS.	
Size of spindles	$\frac{3}{8}"$
Size of spindle pulleys	$4\frac{1}{2}"$, $6"$, $7"$, $8"$
Vertical run of spindles	4"
Vertical run of table	32"
Greatest distance from spindle to table	36"
Size of table	$12" \times 38"$
Diameter of column	5"
Will drill to center of circle	$13"$ and $25"$
Size of tight and loose pulleys, face	$8"$, $8"$
Size of cone steps	$7"$, $8\frac{1}{2}"$, $10\frac{1}{2}"$, $12\frac{1}{2}"$
Size of driving pulley on base	12"
Size of base	20"
Total height of drill	70"
Weight	800 lbs.

SENSITIVE DRILLS.

FOUR-SPINDLE DRILL.



FIG. 11249.

(Description on preceding page.)

TWO-SPINDLE DRILL.



FIG. 11250.

DESCRIPTION FIG. 11250.

This drill is so simple that hardly a word is needed to explain it. It is also a self-contained drill. No countershaft is needed or included. It belts direct from the main line.

About all multiple spindle drills need two belts for each spindle, and one of those is a quarter twist, which is a very bad thing on a short belt. With this drill, only one belt for each spindle is needed, and that a straight, open belt. This desirable feature is obtained by a pair of bevel gears, one of which is a rawhide gear, so there is not any noise from the gears. These gears drive the upright shafts with the cone pulleys on top, then a 1 1/2" belt drives the spindles. The tension of the belt is never on the spindle. The quill has steel rack and pinion. The spindle is made of the best crucible steel, and is reamed with Morse taper No. 1. The spindles are counterbalanced with a coil spring, which can be adjusted to any degree of sensitiveness. The spindles are 8" apart, and have an adjustment on the side of 12". Spindles have stop collars. The table is counterbalanced by weight inside of column. The table is provided with oil-channel, and is free to swing either way.

SPECIFICATIONS.

Size of spindles.....	7/8"
Vertical run of spindles.....	4"
Greatest distance from spindles to table.....	32"
Size of table.....	12" x 24"
Diameter of column.....	4 1/2"
Will drill to center of.....	16"
Size of tight and loose pulleys.....	7" x 2 1/2"
Size of base.....	35"
Total height of drill.....	70"
Distance between spindles.....	8"
Net weight.....	500 lbs.
Gross weight.....	650 lbs.
Size of box.....	73" x 37" x 27"

MOTOR DRIVEN SENSITIVE DRILLS.

DESCRIPTION FIG. 11261.

This machine has a capacity for drilling holes from 0" to 3/4" and is intended for light work requiring accuracy and very rapid handling.

The motor is mounted upon the frame directly over the spindle, and has a hollow shaft through which the drill spindle slides and is driven by a key.

Three speeds are provided, ranging from 700 to 1,300 revolutions per minute, which are obtained by simply moving the starting handle on the side of the motor to a position giving the speed desired.

An index gives the exact speed of the spindle for each of the three positions of the starting lever.

The motor, being of the slow speed type, is extremely durable and requires no starting resistance.

This tool has but three bearings and, as there is no side pull upon any of them as in machines driven by belts or friction wheels, the loss of power through friction is very small and wear of bearings is reduced to a minimum.

The spindle has a ball thrust bearing, and is counterbalanced by a spring, and the table by a weight inside the column. An index line is made on column so table can be centered at any height on column.

A chuck of standard make fitted to the spindle, is furnished with the tool, also V block, cup and point centers, making it complete and ready for work as soon as wires are attached.

SPECIFICATIONS.

Drills up to 3/4" hole center of.....	12"
Greatest distance from spindle to table.....	38"
Vertical traverse of spindle.....	3"
Diameter of table.....	11 1/2"
Total height of drill.....	73"
Weight of machine.....	250 lbs.
Weight crated for domestic shipment.....	325 lbs.
Weight boxed for foreign shipment.....	400 lbs.
Outside dimensions of box for foreign shipment.....	15" x 24" x 80"
Maximum horse-power of motor.....	1/2
Morse taper end of spindle.....	No. 2
Floor space.....	14" x 18"



FIG. 11261.

DESCRIPTION FIG. 11262.

This drill is driven by electric motor through the medium of a friction disk, giving a very wide variation in spindle speeds. A servicable machine for light, sensitive drilling.

SPECIFICATIONS.

Drills in center of.....	12"
Greatest distance spindle to table.....	38"
Traverse of spindle.....	3"
Diameter of table.....	11 1/2"
Total height of drill.....	67"
Hole in spindle fits No. 1 Morse taper.	
Weight of machine.....	175 lbs.
Weight of machine crated for domestic shipment.....	225 lbs.
Weight of machine boxed for foreign shipment.....	250 lbs.
Dimensions of box for foreign shipment.....	15" x 22" x 70"
Maximum horse-power of motor.....	1/2

Notes: Motors are wound for a direct current of either 110 or 220 volts. In ordering always specify current on which motors are to operate.



FIG. 11262.

MANUFACTURERS' HIGH SPEED DRILL PRESSES.

SINGLE SPINDLE DRILL WITH TABLE ELEVATING DEVICE.



FIG. 11253.

SINGLE SPINDLE DRILL WITH TABLE ELEVATING DEVICE.



FIG. 11264.

NOTE: Drill is built with or without table elevating device, as desired

SPECIFICATIONS FIGS. 11253 TO 11255.

Number of Machine and No. of Spindles.	1.	2.	3.	4.	5.	6.
Spindles center to column face.....	8"	8"	8"	8"	8"	8"
Space between spindle centers.....	.....	10"	9½"	9"	8"	8"
Greatest distance spindle to table.....	32"	32"	32"	32"	32"	32"
Vertical traverse of spindle.....	13"	13"	13"	13"	13"	13"
Length of feed.....	5"	5"	5"	5"	5"	5"
Size of table.....	13" x 15"	14" x 25½"	14½" x 34"	14½" x 44"	14½" x 53"	14½" x 53"
Size of spindle.....	¾"	¾"	¾"	¾"	¾"	¾"
Size of spindle belt.....	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"
Drill capacity.....	¾"	¾"	¾"	¾"	¾"	¾"
Hole in spindle Morse taper.....	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2

Pulleys on countershaft 8" diameter for 1½" belt.

For ordinary work with high speed drills, countershaft should run 600 revolutions per minute.

All machines equipped with 1¼" endless belts.

For general description see following page.

MANUFACTURERS' HIGH SPEED DRILL PRESSES.

FOUR SPINDLE DRILL



FIG. 11250.

DESCRIPTION FIGS. 11253 TO 11255.

This machine is designed especially for the rapid and accurate production of large numbers of duplicate parts which are made with jigs and is furnished with any number of spindles from one to six. It will drive a $3/4$ " high speed twist drill up to its limit of endurance, and do this work continuously without injury to the machine itself.

Every bearing on the drill press is a ball bearing made on the four-point contact system, insuring the least possible friction when running.

The spindle is driven by a two-step cone pulley which is so arranged that all belt strain is removed from the spindle itself, thus allowing the spindle to run absolutely free in its bearings.

The idler pulleys carrying the endless belt are mounted on a bracket of very ingenious design. This bracket is raised or lowered to shift the belt on the spindle pulley from one step to the other by means of a hand lever on right hand side of machine (see Fig. 11253).

For tightening or loosening the belt a slide carrying the idlers is mounted on the bracket. This slide is run backward or forward by rack and pinion operated by a small hand wheel (see Fig. 11254).

Provision is made for two additional spindle speeds by the shifting of pulleys on the back driving shaft, thus giving the spindle four speeds.

For specifications see page 144.

14" UPRIGHT DRILL PRESS.

DESCRIPTION FIGS. 11256 AND 11257.

The cuts show our new 14" drill for light and medium work, and we offer it as the best machine on the market, believing that it meets fully the increasing demand for a strong, durable and positive driven drill suitable for use in places where a larger and heavier tool would not be required. It is belt driven, the five-step cones allowing a wide range of speeds; and with the strong positive driving power it gives a machine well adapted for the general run of light and medium drilling.

We guarantee it to drill from $\frac{1}{8}$ " to $\frac{3}{4}$ ". This drill is regularly built with plain lever feed and with power feed including lever. Round table can be supplied in place of square table, if desired, but at extra charge.

SPECIFICATIONS.

Height of drill	64"
Distance from column to center of table	7 $\frac{1}{2}$ "
Diameter of column	4"
Size of table	10" x 12"
Diameter of spindle	9 $\frac{1}{2}$ "
Hole in spindle, Morse taper	No. 2
Vertical travel of table	24 $\frac{1}{2}$ "
Vertical travel of spindle	6"
Greatest distance from spindle to base	40"
Greatest distance from spindle to table	31 $\frac{1}{2}$ "
Diameter of large pulley on cone	8"
Diameter of small pulley on cone	2 $\frac{1}{2}$ "
Cone pulleys carry belt	1 $\frac{1}{2}$ "
Diameter of crown gear	3 $\frac{1}{2}$ "
Diameter of bevel pinion	2 $\frac{1}{2}$ "
Size of tight and loose pulleys	6" x 2"
Speed of tight and loose pulleys, revolutions per minute	600
Floor space required	19" x 30"
Weight, net	250 lbs.
Weight, crated	300 lbs.



WITH RATCHET LEVER.

FIG. 11256.



WITH LEVER AND POWER FEED.

FIG. 11257.

20" STATIONARY HEAD UPRIGHT DRILL.

DESCRIPTION FIGS. 11258 AND 11259.

The spindle is counterbalanced and has a quick return motion. The table has a vertical adjustment on the column by a screw, and can be swung to one side, allowing the use of the base plate for planing work upon when necessary. A driving shaft, with friction pulleys, can be supplied if the machine is desired for tapping purposes, or tapping device shown in Fig. 11274 can be supplied.

SPECIFICATIONS.

Distance from post to center of table	10"	10"
Distance from spindle to base	44"	42"
Distance from spindle to table	24"	21"
Travel of spindle	8"	8"
Diameter of spindle	1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "
Hole in spindle, Morse taper	No. 3	No. 3
Belt on cones	2 $\frac{1}{2}$ "	2 $\frac{1}{4}$ "
Driving pulleys	9" x 2 $\frac{1}{2}$ "	9" x 2 $\frac{1}{2}$ "
Speed of driving pulleys, revolutions per minute	240	250
Total height	62"	67"
Weight	630 lbs.	700 lbs.



WITH WHEEL AND LEVER FEED.

FIG. 11258.



WITH WHEEL AND LEVER AND POWER FEED AND BACK GEARS, ALSO AUTOMATIC STOP.

FIG. 11259.

20" STATIONARY HEAD UPRIGHT DRILL.

SPECIFICATIONS FIGS. 11260 AND 11261.

Drills to center of.....	20 $\frac{1}{4}$ "
Feed of spindle.....	8"
Spindle to base.....	42"
Diameter of table.....	16"
Diameter of spindle in bearing.....	1 $\frac{3}{4}$ "
Diameter of column.....	5 $\frac{1}{4}$ "
Driving pulleys.....	9 $\frac{1}{4}$ " x 2 $\frac{1}{4}$ "
Speed of driving pulley, R. P. M.....	300
Weight.....	600 lbs.
Floor space.....	18" x 46"
Hole in spindle, Morse taper.....	No. 3

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WITH WHEEL AND LEVER AND POWER FEED, BACK GEARS AND AUTO-MATIC STOP.

FIG. 11261.



WITH WHEEL AND LEVER FEED.

FIG. 11260.

This drill is built in the following styles:
 With plain lever feed.
 With combined wheel and lever feed.
 With wheel and lever and power feed and automatic stop.

With wheel and lever and power feed, automatic stop and back gears.

Machine can be furnished with round base like that shown in Fig. 11256 instead of square base here shown, if so desired.

20" SLIDING HEAD UPRIGHT DRILL.



FIG. 11262.

DESCRIPTION FIG. 11262.

The head is vertically adjustable on column. This machine has both hand and power feed and an automatic trip or stop motion. The head and spindle are counter-balanced and spindle has quick return. The table can be round or square as preferred.

This drill can be used for tapping if driven by friction reversing pulleys, or can be fitted with device shown in Fig. 11274.

SPECIFICATIONS.

Diameter of table, 16". Distance from post to center of table, 10". Maximum distance, spindle to base, 48"; spindle to table, 30". Vertical traverse of table, 21"; of head, 12"; of spindle, 7½". Diameter of spindle, 1¼". Hole in spindle, Morse taper No. 3. Width of belt on cone, 2¼". Driving pulleys, 9" x 2¼". Speed of lower shaft, 240. Floor space, 44" x 18". Height of machine to top of cone, 76". Weight, 750 lbs.

21" STATIONARY HEAD DRILL PRESS.

DESCRIPTION FIG. 11263.

Built in the following styles:

With wheel and lever feed, as shown.

With power feed and automatic stop.

With power feed, automatic stop and back gears.

With power feed, automatic stop and back gears.

With power feed, automatic stop and back gears.

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With power feed, automatic stop and back gears.

21" STATIONARY HEAD DRILL.



FIG. 11263.

WITH WHEEL AND LEVER FEED.

SPECIFICATIONS, FIG. 11263.

Diameter of spindle in sleeve, 1½".

Diameter of spindle above sleeve, 1½".

Diameter of sleeve, 2½".

Traverse of spindle, 9".

Spindle bore to fit Morse taper No. 3.

Tight and loose pulleys, 10" x 2¼".

Speed of lower shaft, 350 revolutions per minute.

Tapping attachment, as shown in Fig. 11273, can be supplied, if desired.

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Tapping attachment, as shown in Fig. 11273, can be supplied, if desired.

21" SLIDING HEAD UPRIGHT DRILL.

DESCRIPTION FIG. 11264.

This machine is of similar design to that shown in Fig. 11262, but is larger, heavier and is fitted with back gears in addition to the usual attachments.

SPECIFICATIONS.

Diameter of table, 19". Distance from post to center of table, 10½".

Maximum distance, spindle to base, 48"; spindle to table, 27".

Vertical traverse of table, 15"; of head, 10½"; of spindle, 8".

Diameter of spindle, 1½".

Hole in spindle, Morse taper No. 3. Width of belt on cone, 2½".

Driving pulleys, 11½" x 3". Speed of lower shaft, 240. Floor space, 54" x 22".

Height of machine to top of cone, 82". Weight, 1,020 lbs.

Attachment for tapping, as shown in Fig. 11274, can be supplied, if desired.

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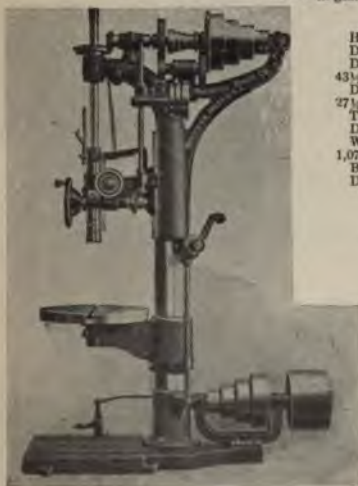
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FIG. 11264.



23" STATIONARY HEAD DRILLS.

DESCRIPTION FIGS. 11265 AND 11266



WITH WHEEL AND LEVER FEED AND BACK GEARS.

FIG. 11265.



WITH POWER FEED AND BACK GEARS.

FIG. 11266.

These machines are constructed of first quality material; and workmanship is of the best. The spindle is made of crucible steel forging, is counterbalanced and has quick return device. There are eight changes of speed and three changes of power feed. All gears are cut from solid stock. The driving cones are extra large and with wide face giving great belt power. A $1\frac{1}{2}$ " hole in cast iron may be drilled without using back gears.

The table is raised and lowered by means of a screw, as shown in cut, and may be swung out of the way (to one side), in case the operator wishes to secure the work to the base plate.

These machines are fitted with motor drive, tapping attachment (see Fig. 11274) or right angle drive, at extra cost, if desired.

SPECIFICATIONS.

Distance from post to center of table, $11\frac{1}{4}$ ". Greatest distance from spindle to table, 25". Greatest distance from spindle to base, 43". Vertical traverse of spindle, $7\frac{1}{2}$ ". Diameter of spindle, $1\frac{1}{8}$ ". Hole in spindle, Morse taper No. 3. Speed of lower shaft, 250 revolutions per minute. Greatest cone diameter, $11" \times 2\frac{1}{2}"$. Driving pulleys, $11" \times 3\frac{1}{4}"$. Floor space, $46" \times 16"$. Total height of machine to top of cone, 74". Weight, 900 lbs.

SLIDING HEAD UPRIGHT DRILLS.

24", 28", 32", 36" AND 42".

SPECIFICATIONS FIG. 11267.

Size.....	24"	28"	32"	36"	42"
Height.....	28"	71 ⁰ ₀ "	32"	36"	73 ⁰ ₀ "
Drills to center...	25"	29"	33"	37"	43"
Distance between base and spindle...	46"	52"	54"	57"	58"
Distance between table and spindle...	36 ⁰ ₀ "	39 ⁰ ₀ "	41"	42"	47"
Traverse of table...	10 ⁰ ₀ "	20 ⁰ ₀ "	20 ⁰ ₀ "	19 ⁰ ₀ "	21"
Traverse of head...	21 ⁰ ₀ "	20 ⁰ ₀ "	24 ⁰ ₀ "	20 ⁰ ₀ "	24 ⁰ ₀ "
Diameter of table...	32"	32"	32"	32"	36"
Diameter of column.....	7"	7 ⁰ ₀ "	8 ⁰ ₀ "	9 ⁰ ₀ "	10"
Diameter spindle in sleeve.....	1 ⁰ ₀ "	1 ⁰ ₀ "	1 ⁰ ₀ "	2 ⁰ ₀ "	2 ⁰ ₀ "
Diameter spindle above sleeve.....	1 ⁰ ₀ "	1 ⁰ ₀ "	1 ⁰ ₀ "	1 ⁰ ₀ "	2 ⁰ ₀ "
Diameter sleeve.....	2 ⁰ ₀ "	2 ⁰ ₀ "	3"	3 ⁰ ₀ "	3 ⁰ ₀ "
Traverse spindle.....	11"	12"	13"	14 ⁰ ₀ "	16"
Morse taper.....	No. 4	No. 4	No. 4	No. 5	No. 5
Diameter of crown gear.....	7 ⁰ ₀ "	8 ⁰ ₀ "	9 ⁰ ₀ "	10 ⁰ ₀ "	11 ⁰ ₀ "
Ratio bevel gears.....	2 ⁰ ₀ ₁	2 ⁰ ₀ ₁	2 ⁰ ₀ ₁	2 ⁰ ₀ ₁	2 ⁰ ₀ ₁
Ratio back gears.....	6:1	6:1	6:1	6:1	6:1
Tight and loose pulleys.....	12" x 3"	12" x 3 ⁰ ₀ "	14" x 3 ⁰ ₀ "	14" x 4"	16" x 4 ⁰ ₀ "
Diameter cone pulleys.....	5" to 11"	6" to 12"	7" to 13"	8 ⁰ ₀ " to 14"	7" to 16"
Fuse, rope pulleys.....	2 ⁰ ₀ "	3 ⁰ ₀ "	3 ⁰ ₀ "	3 ⁰ ₀ "	4 ⁰ ₀ "
Speed of countershaft, revolutions per minute.....	350	325	325	275	300
Floor space.....	21 ⁰ ₀ " x 5 ⁰ ₀ "	24" x 6 ⁰ ₀ "	26" x 7 ⁰ ₀ "	28 ⁰ ₀ " x 7 ⁰ ₀ "	30" x 9 ⁰ ₀ "
Weight.....	1,450 lbs.	2,350 lbs.	2,850 lbs.	3,750 lbs.	4,600 lbs.

Note: Cut shows 32" machine.

Compound table for these machines shown in Fig. 11271. Tapping attachment, as shown in Fig. 11273, can be applied to these drills if desired.

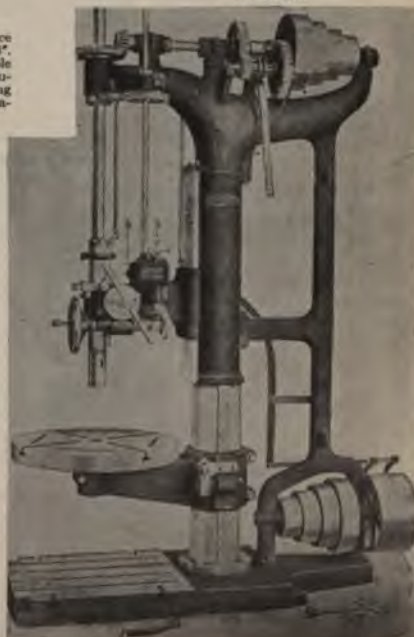


FIG. 11267.

20" SLIDING HEAD UPRIGHT DRILL.



FIG. 11262.

DESCRIPTION FIG. 11262.

The head is vertically adjustable on column. This machine has both hand and power feed and an automatic trip or stop motion. The head and spindle are counter-balanced and spindle has quick return. The table can be round or square as preferred.

This drill can be used for tapping if driven by friction reversing pulleys, or can be fitted with device shown in Fig. 11274.

SPECIFICATIONS.

Diameter of table, 10". Distance from post to center of table, 10". Maximum distance, spindle to base, 48"; spindle to table, 30". Vertical traverse of table, 21"; of head, 12"; of spindle, 7½". Diameter of spindle, 1¼". Hole in spindle, Morse taper No. 3. Width of belt on cone, 2¼". Driving pulleys, 9" x 2¼". Speed of lower shaft, 240. Floor space, 44" x 18". Height of machine to top of cone, 76". Weight, 750 lbs.

21" STATIONARY HEAD DRILL PRESS.

DESCRIPTION FIG. 11263

Built in the following styles:

With wheel and lever feed, as shown.

With power feed and automatic stop.

With power feed, automatic stop and back gears.



FIG. 11264.

SPECIFICATIONS, FIG. 11264.

Height of drill, 6' 4½".
Drills to center of 21½".
Distance between base and spindle, 43½".
Distance between table and spindle, 27½".
Traverse of table on column, 16¼".
Diameter of table, 19".
Weights, 975 lbs., 1,020 lbs., and 1,075 lbs.
Belt on cones, 2".
Diameter of column, 6".

21" STATIONARY HEAD DRILL.



FIG. 11263.

WITH
WHEEL
AND
LEVER
FEED.

SPECIFICATIONS, FIG. 11263.

Diameter of spindle in sleeve, 1½".
Diameter of spindle above sleeve, 1½".
Diameter of sleeve, 2½".
Traverse of spindle, 9".
Spindle bore to fit Morse taper No. 3.
Tight and loose pulleys, 10" x 2½".
Speed of lower shaft, 350 revolutions per minute.
Tapping attachment, as shown in Fig. 11273, can be supplied, if desired.

21" SLIDING HEAD UPRIGHT DRILL.

DESCRIPTION FIG. 11264.

This machine is of similar design to that shown in Fig. 11262, but is larger, heavier and is fitted with back gears in addition to the usual attachments.

SPECIFICATIONS.

Diameter of table, 19". Distance from post to center of table, 10½". Maximum distance, spindle to base, 48"; spindle to table, 27". Vertical traverse of table, 15"; of head, 10¼"; of spindle, 8". Diameter of spindle, 1½". Hole in spindle, Morse taper No. 3. Width of belt on cone, 2½". Driving pulleys, 11½" x 3". Speed of lower shaft, 240. Floor space, 54" x 22". Height of machine to top of cone, 82". Weight, 1,020 lbs.

Attachment for tapping, as shown in Fig. 11274, can be supplied, if desired.

23" STATIONARY HEAD DRILLS.

DESCRIPTION FIGS. 11265 AND 11266



WITH WHEEL AND LEVER FEED AND BACK GEARS.

FIG. 11265.



WITH POWER FEED AND BACK GEARS.

FIG. 11266.

These machines are constructed of first quality material; and workmanship is of the best. The spindle is made of crucible steel forging, is counterbalanced and has quick return device. There are eight changes of speed and three changes of power feed.

All gears are cut from solid stock. The driving cones are extra large and with wide face giving great belt power. A $1\frac{1}{2}$ " hole in cast iron may be drilled without using back gears.

The table is raised and lowered by means of a screw, as shown in cut, and may be swung out of the way (to one side), in case the operator wishes to secure the work to the base plate.

These machines are fitted with motor drive, tapping attachment (see Fig. 11274) or right angle drive, at extra cost, if desired.

SPECIFICATIONS.

Distance from post to center of table, $11\frac{1}{2}$ ". Greatest distance from spindle to table, 25". Greatest distance from spindle to base, 43". Vertical traverse of spindle, $7\frac{1}{2}$ ". Diameter of spindle, $1\frac{1}{2}$ ". Hole in spindle, Morse taper No. 3. Speed of lower shaft, 250 revolutions per minute. Greatest cone diameter, $11\frac{1}{2}$ " x $2\frac{1}{2}$ ". Driving pulleys, $11\frac{1}{2}$ " x $3\frac{1}{4}$ ". Floor space, $46\frac{1}{2}$ " x $16\frac{1}{2}$ ". Total height of machine to top of cone, 74". Weight, 900 lbs.

SLIDING HEAD UPRIGHT DRILLS.

24", 26", 32", 36" AND 42".

SPECIFICATIONS FIG. 11267.

Size.....	24"	26"	32"	36"	42"
Height.....	7'3"	7'10"	8'8"	9'	9'5"
Drills to center....	25"	29"	33"	37"	43"
Distance between base and spin....	48"	52"	54"	57"	58"
Distance between table and spin....	30 3/4"	35 3/4"	41"	42"	42"
Traverse of table....	19 1/2"	20 1/2"	20 3/4"	19 3/4"	21"
Traverse of base....	21 1/2"	20 1/2"	24 1/2"	23 1/2"	24 3/4"
Diameter of table....	22"	25"	28"	23"	36"
Diameter of table....	7"	7 1/4"	8 1/4"	9 1/4"	10"
Diameter spindle in sleeve....	1 1/4"	1 1/4"	1 1/4"	2 1/4"	3 1/4"
Diameter spindle above sleeve....	1 1/4"	1 1/4"	1 1/4"	1 1/4"	2 1/4"
Diameter sleeve....	2 1/2"	2 1/2"	3 1/2"	3 1/2"	5 1/2"
Traverse spindle....	11"	12"	12"	14 1/4"	10"
Morse taper....	No. 4	No. 4	No. 4	No. 5	No. 5
Diameter of cones gear....	7 1/2"	8 1/4"	9 1/4"	10 1/4"	11 1/4"
Ratio lower gears....	2 1/2:1	2 1/2:1	2 1/2:1	2 1/2:1	2 1/2:1
Ratio back gears....	6:1	6:1	6:1	6:1	6:1
Tight and loose pulleys....	12" x 3"	12" x 3 1/4"	14" x 3 1/4"	14" x 4"	10" x 4 1/4"
Diameter cone pulleys....	8" to 11"	8" to 12"	7" to 13"	6 1/4" to 14"	7" to 10"
Face, cone pulleys....	2 1/2"	3 1/4"	3 1/2"	3 1/4"	4 1/4"
Speed of counter-shaft, revs....	350	325	325	275	260
Cones per minute....	21 1/2 x 2 1/2"	24" x 6 1/4"	28" x 7 1/4"	28 1/4" x 7 1/4"	20" x 5 1/2"
Floor space....	1,850 lbs.	2,250 lbs.	2,850 lbs.	3,700 lbs.	4,000 lbs.
Weight.....					

Note: Cut shows 32" machine.

Compound table for these machines shown in Fig. 11271. Tapping attachment, as shown in Fig. 11273, can be applied to these drills if desired.

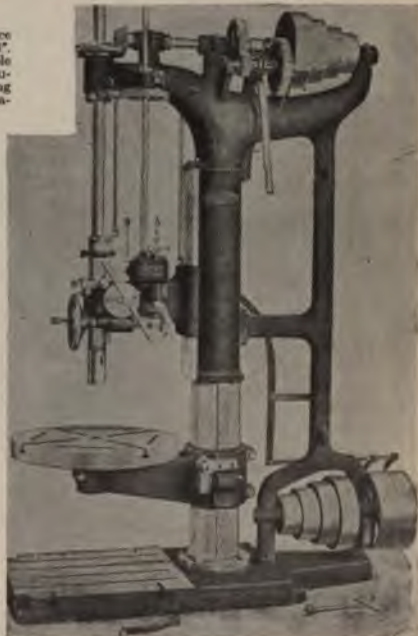


FIG. 11267.

24", 26" AND 28" STATIONARY HEAD UPRIGHT DRILLS.

BACK GEARS, HAND AND POWER FEED, AUTOMATIC STOP.

DESCRIPTION FIG. 11268.

With several machines running with proper jigs, the same amount of work can be done with half to one-fifth the cost of labor, according to the number of machines used, that can be done with ordinary drill presses.

It has a lever that can be used for counter sinking and light, quick drilling. It can be operated as easily as a light machine.

By adjusting thumb nut on side of quill, can drill to any desired depth required; and with the quick return it can be thrown back immediately, and is ready to operate again.

The back gears are thrown out with a lever, without having to use nuts, screws or wrenches.

The bevel gears are about two to one, which makes it very powerful without the back gears.

The spindle is counterbalanced with weight and chain, which takes up lost motion and prevents breaking of drills.

These machines are made of best material and workmanship. The rack is cut from solid piece of steel, as are also the feed pinions on shaft and worm. All running gears and clutches are cut from the solid.

The machines are made with or without back gears, self-feed, reverse motion, or automatic stop, as desired by the purchaser.

All machines are run and tested before leaving the factory.

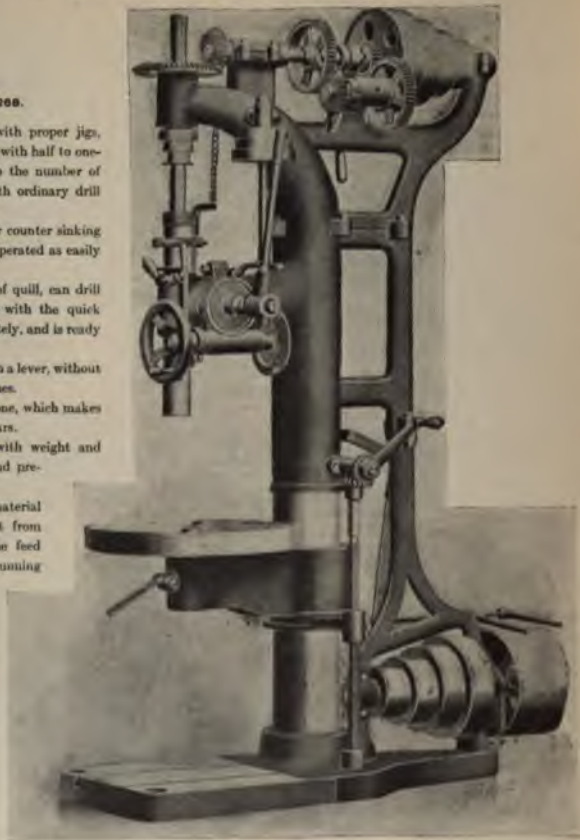


FIG. 11268.

SPECIFICATIONS.

24" drills to center of.....	24½"	Width of pulleys.....	3"
26" drills to center of.....	26½"	Speed of pulleys.....	200
28" drills to center of.....	28½"	Total height of machine.....	80"
Distance spindle to base.....	41"	Diameter of column.....	7"
Diameter of table.....	21"-23"	Diameter of pulleys.....	12"
Vertical feed of spindle.....	9½"	Hole in spindle Morse taper.....	No. 4
Diameter of spindle of 24".....	1½"	Floor space.....	18" x 56"
26" and 28".....	1¾"	Diameter of quill.....	2¼" and 3"
Width of belt on cone.....	2¼"	Weight.....	1,300 lbs., 1,350 lbs.

THE FAIRBANKS COMPANY

STANDARD PATTERN, GEAR FEED, VERTICAL DRILLING MACHINES.

WITH SLIDING HEAD.

SIZES: 24", 26", 28", 30", 36", 42"
AND 50".

DESCRIPTION FIG. 11269.

These machines are of new design and so constructed as to do the greatest possible amount of work within a given time.

Their advantages over other machines of a similar character are plainly recognized by users of drilling machines.

The back gears are so arranged that the spindle may be instantly changed from high to low speed or the reverse, without stopping the machine, by simply operating the back gear lever, which is easily reached from the front of the machine.

Four changes of geared feed are provided, all of which can be made instantly, at any time, without stopping the machine. The device for changing the feed is within easy reach of the operator. The trouble heretofore experienced with slipping feed belts is eliminated by using this geared feed.

A four-step cone with the back gearing gives eight changes of speed to the spindle.

Our improved quick return and stop motions make it possible to quick approach or return the spindle, and engage or disengage the power feed, all with the same lever and with the use of one hand only.

The sliding head and spindle are counterbalanced, and the head is adjusted vertically by means of a rack and pinion.

Friction pulleys can be supplied for tapping or our special device for tapping can be attached to the spindle at extra cost (see Fig. 11274).

Compound table, as shown in Fig. 11275, can be supplied with these machines at extra cost.

These drills can be readily arranged to be driven by electric motors.

BACK GEARS,
POWER FEED,
AUTOMATIC
STOP.

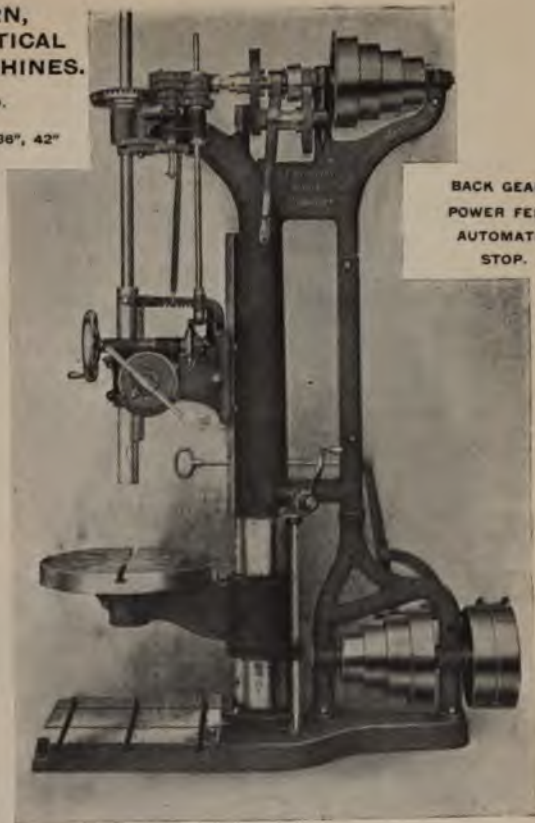


FIG. 11269.

SPECIFICATIONS.

Size of Drill.	24"	26"	28"	30"	36"	42"	50"
Distance from center of spindle to column.....	121½"	131½"	141½"	151½"	181½"	211½"	251½"
Maximum distance from spindle to base.....	40"	43"	48"	48"	55"	59"	63"
Maximum distance from spindle to table.....	27"	29"	34"	33"	38"	40"	30"
Vertical adjustment of table.....	15"	18"	17½"	15"	13"	11"	11"
Vertical traverse of spindle.....	9"	11"	12½"	14½"	16½"	15½"	15½"
Hole in spindle, Morse taper No.....	4	4	4	4	5	5	5
Total height of machine.....	81"	88"	97"	100"	113"	120"	129"
Diameter of spindle.....	1½"	1½"	1¾"	1¾"	2"	2½"	2½"
Diameter of table.....	20½"	22½"	23½"	25"	28"	30"	42"
Largest diameter of cone.....	10½"	11"	12½"	13"	14½"	14"	14"
Width of belt on cone.....	2½"	3"	3"	3"	4"	3½"	3½"
Driving pulleys.....	11" x 3½"	12" x 3½"	14" x 3½"	14" x 3½"	16" x 4½"	16" x 5"	16" x 5"
Speed of bottom shaft, revolutions per minute.....	300	300	300	300	300	250	250
Net weight.....	1,400 lbs.	1,700 lbs.	2,200 lbs.	2,400 lbs.	3,200 lbs.	4,700 lbs.	5,500 lbs.
Boxed weight.....	1,815 lbs.	2,200 lbs.	2,820 lbs.	3,195 lbs.	4,090 lbs.	5,875 lbs.	6,875 lbs.
Cubic feet.....	63	81	102	120	158	235	275

25" STATIONARY HEAD UPRIGHT DRILL.

WITH GEARED POWER FEED,
BACK GEARS AND AUTO-
MATIC STOP.

DESCRIPTION FIG. 11270.

Four changes of geared feed are provided, all of which can be made instantly, at any time, without stopping the machine. The device for changing the feed is within easy reach of the operator. The trouble heretofore experienced with slipping feed-belts is eliminated by using this geared feed.

A four step cone with the back gearing gives eight changes of speed to the spindle.

Hole in spindle, Morse taper No. 4.

Friction pulleys can be supplied for tapping or our special device for tapping (see Fig. 11274) can be attached to the spindle at extra cost. Motor attached, if desired.

SPECIFICATIONS.

Distance from center of spindle to column, 12 $\frac{3}{8}$ ".

Maximum distance from spindle to base, 38".

Maximum distance from spindle to table, 25 $\frac{1}{4}$ ".

Vertical adjustment of table, 25".

Vertical traverse of spindle, 12 $\frac{1}{2}$ ".

Hole in spindle, Morse taper No. 4.

Total height of machine, 81".

Diameter of spindle, 1 $\frac{1}{2}$ ".

Diameter of table, 21".

Largest diameter of cone, 11".

Width of belt on cone, 3".

Driving pulleys, 11" x 3 $\frac{1}{8}$ ".

Speed of bottom shaft, 300 revolutions per minute.

Net weight, 1,300 lbs.



FIG. 11270.

INDEPENDENT COMPOUND TABLE.

DESCRIPTION FIG. 11271.

Designed primarily for use with drills shown in Fig. 11267, but can be adapted to any machines of similar size.

Size Drill.	Dimensions of table.	Cross feed.	Lateral feed.	Distance from base to top of table.	Distance from spindle to table.	Distance from spindle to back.
24"	18" x 24"	14 $\frac{1}{4}$ "	15 $\frac{1}{4}$ "	20"	28"	45"
28"	22" x 26"	15 $\frac{1}{4}$ "	16 $\frac{1}{4}$ "	20"	32"	52"
32"	22" x 30"	19"	20 $\frac{1}{4}$ "	20"	34"	54"
36"	24" x 32"	20 $\frac{1}{4}$ "	22 $\frac{1}{4}$ "	20"	37"	57"
42"	24" x 32"	23 $\frac{1}{4}$ "	22 $\frac{1}{4}$ "	20"	38"	58"



FIG. 11271.

24", 26", 28" AND 30" DRILLS.

WITH ADJUSTABLE HEAD.

DESCRIPTION FIG. 11272.

These machines are made of best material and workmanship. The rack is cut from solid piece of steel, as are also the feed pinions in shaft and worm and shaft. All running gears and clutches are cut from the solid.

The machines are made with or without back gears, self-feed reverse motion, or automatic stop, as desired by the purchaser.

The head is adjustable on the column giving a capacity of 54" between spindle and base plate, and a vertical adjustment of 26".

All machines are run and tested before leaving factory.

DIMENSIONS AS FOLLOWS.

Height of drill	98"
24" drills to center of	24 1/4"
26" drills to center of	26 1/4"
28" drills to center of	28 1/4"
Diameter of table	21"
Vertical feed of 24"	9"
Vertical feed of 26"	10"
Spindle has Morse taper.	No. 4
Diameter of quill on 24"	2 1/4"
Diameter of quill on 26"	3"
Floor space	18" x 48"
Diameter of spindle of 24"	1 1/2"
Diameter of spindle of 26"	1 3/4"
Diameter of column	7"
Diameter of tight and loose pulleys	11"
Face of pulleys	3 1/2"
Speed of drive pulleys, revolutions	200
Weight of 24"	1,550 lbs.
Weight of 26"	1,550 lbs.
Weight, boxed	1,900 lbs.

21" DRILL PRESS WITH TAPPING ATTACHMENT.

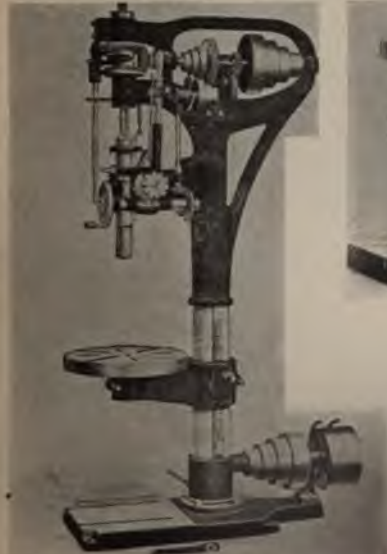
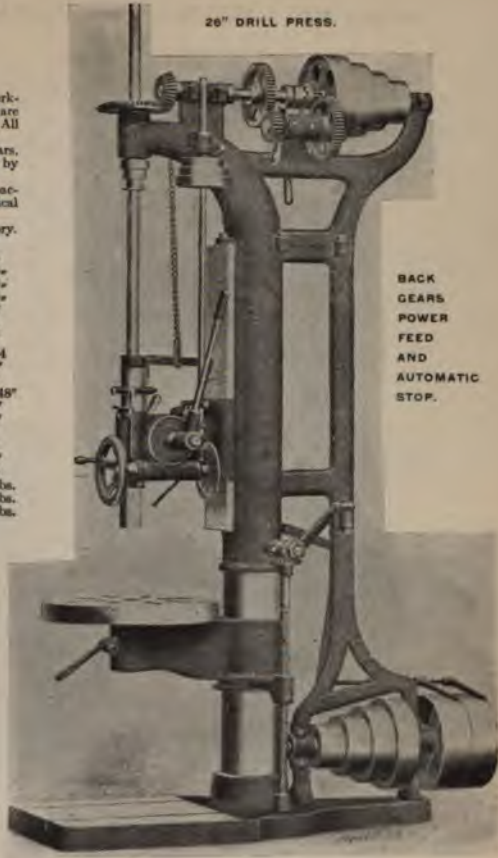


FIG. 11273.

26" DRILL PRESS.



BACK
GEARS
POWER
FEED
AND
AUTOMATIC
STOP.

FIG. 11272.

21" DRILL PRESS WITH TAPPING ATTACHMENT

DESCRIPTION FIG. 11273.

General specifications are same as for Fig. 11263. The spindle can be driven in either direction and will handle either right or left hand taps equally well. This machine returns the tap at the same speed at which it is driven forward, and is a most satisfactory tool for such work as can be handled on a drill of this size.

The attachment embodies the feature enabling the operator to stop, start and reverse the spindle instantly by means of the lever shown at the left, thus saving a great amount of time in the changing of bits, sockets and drills.

The custom ground tapping attachment increases the weight of set of the 21" Drill Press.

The machine can be furnished on larger sizes.

DRILLING MACHINE WITH TAPPING ATTACHMENT.

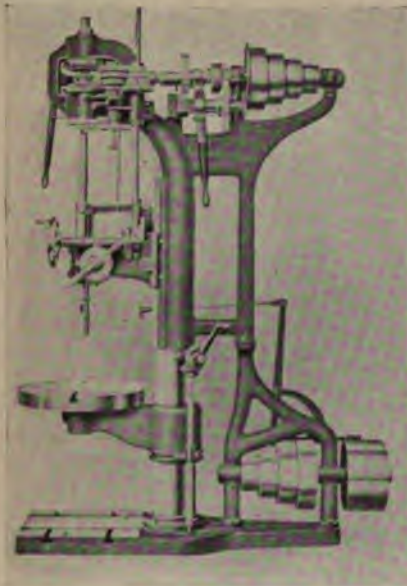


FIG. 11274.

Tapping attachment direct on spindle with positive clutch, shifted by means of lever.

This tapping device can be applied to any of the drills described in Fig. 11269, and the specifications for those machines apply to the tapping drills also.

DRILL PRESS WITH COMPOUND TABLE.

DESCRIPTION FIG. 11275.

This machine is the same as that shown in Fig. 11269 with the addition of compound table, which attachment can be furnished for any size of drill shown in Fig. 11269.

SPECIFICATIONS OF COMPOUND TABLES.

For	24" & 26" Drills.	28" & 30" Drills.	36" Drill.	42" & 50" Drills.
Surface of table	20" x 22"	22" x 26"	22" x 26"	24" x 32"
In and out traverse . . .	12½"	18½"	21"	30"
Cross traverse	14¼"	17½"	17½"	20"
Height from base.	20"	20½"	21½"	22¼"

DESCRIPTION FIG. 11274.

Its advantages over other machines of a similar character are plainly recognized by users of drilling machines.

The back gears are so arranged that the spindle may be instantly changed from high to low speed or the reverse, without stopping the machine, by simply operating the back gear lever, which is easily reached from the front of the machine.

Four changes of geared feed are provided, all of which can be made instantly at any time without stopping the machine. The device for changing the feed is within easy reach of the operator. The trouble heretofore experienced with slipping feed belts is eliminated by using this geared feed.

A four step cone with the back gearing gives eight changes of speed to the spindle.

Our improved quick return and stop motions make it possible to quick approach or return the spindle, and engage or disengage the power feed, all with the same lever and with the use of one hand only.

The sliding head and spindle are counterbalanced, and the head is adjusted vertically by means of a rack and pinion.

DRILL PRESS WITH COMPOUND TABLE.

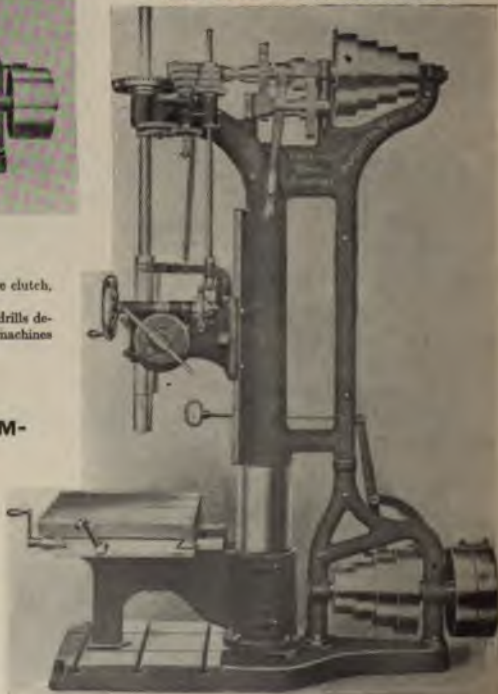


FIG. 11275.

NEW GEAR SPEED CHANGE UPRIGHT DRILLING MACHINE.

DESCRIPTION FIGS. 11276 TO 11278.

The constantly increasing demand for time saving machinery caused us to design and build this new upright drilling machine. All sixteen spindle speeds are obtained by means of gears and friction clutches which operate instantly and without stopping machine, the operator can change all speeds and feeds without leaving his usual position. The accompanying illustrations and descriptive matter are intended for users and purchasers of drilling machines who are interested in up-to-date time saving machinery.

As compared with the ordinary drill of its type, the most interesting mechanical feature is the arrangement whereby sixteen changes of speed are obtained without shifting the driving belt. Fig. 11276 shows a general view of the drill, Fig. 11278 a vertical elevation, and Fig. 11277 a detail of the change gear box.

Driving belt runs on a single pulley, A, Fig. 11278, and power is communicated to the drill spindle through the gear box C. The handles D, E, and F, situated within easy access of the operator, actuate the spools U, V, and W, which, in conjunction with friction disks and friction rings, Fig. 11277, give eight changes of speed. The levers D, E, and F move independently, and each controls two friction clutches. Between the limits of their movements both clutches are disengaged when any one of the levers is in its intermediate position, and the drill spindle is idle. In other words, it is necessary that one or the other of the friction clutches operated by each lever be engaged in order to drive the spindle. Therefore it is impossible for the operator to engage conflicting ratios of gearing. All speeds are in the same direction.

How the eight speeds are possible through the gear box on the lower shaft engaged, by reference to Fig. 11277. With the right hand clutch on the lower shaft engaged,

the spur gear *a* drives the spur gear *b* on the intermediate shaft. The resulting speed of the spindle is still dependent upon the position of the two upper clutches. The intermediate shaft carries the gear *d*, and when it is being driven by *b*, gear *c* is running idly, and the gear *g* or *e*, depending upon the position of the clutch-spool on the shaft carrying these gears. Assuming that this is also in its right hand position, then the gear *e* is driving the corresponding spindle and communicating power to the gear *j* or *i*, again depending upon the position of the clutch spool next above. Assuming again that the top right hand clutch is engaged, the shaft carrying the bevel gear *G* is being revolved by the gear *i*, giving one of the eight speeds. If the left hand clutch on the top spindle is engaged, the other clutches remaining as before, another speed of the gear *G* is obtained through the quill from gear *j*. This is driven from the gear *k*, on the second shaft, which is being driven by gear *e*, etc. Reversing each clutch gives another speed for each of the different positions of the other clutches. As all of the gears are in mesh all are oper-

THE FAIRBANKS COMPANY

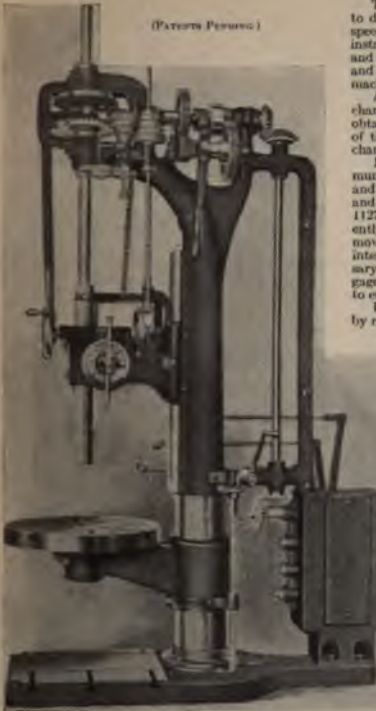


FIG. 11276.

ative when all of the clutches are engaged in one or another of their positions, and those corresponding to the unengaged clutches merely run idly.

The bevel gears *G* and *H* drive the vertical shaft *B*, Fig. 11278, at the top of which is the bevel gear *L* meshing with *J*. Gears *K*, *L*, *M*, and *N* driven through the quill *O*, run continuously with the vertical shaft *B*. Through these gears two speeds are obtainable for each of the settings of the gear box *C*. When high spindle speeds are wanted, the friction spool *F*, having clutch teeth on the end opposite the friction, is operated by a lever to engage the friction ring *Q*, with the friction disk *R*, which is integral with the quill *O*. To run with the back gears and obtain a slower range of speeds, the clutch teeth on the friction spool *F* are engaged with the clutch teeth of the gear *N*, causing the horizontal top shaft to drive through the back gears. The horizontal shaft through the bevel gears *S* and *T* drives the drill spindle.

This drill is built in three sizes as per specifications on following page.

Tapping attachment shown in Fig. 11276 is not regularly furnished and should be specified if wanted.

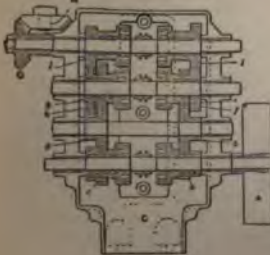


FIG. 11277.

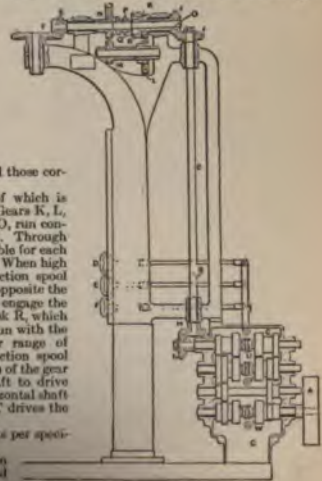


FIG. 11278.

GEAR SPEED CHANGE VERTICAL DRILLING MACHINES.

SPECIFICATIONS FIGS. 11276 TO 11278.—Continued.

Size of drill.....	20"	30"	36"
Distance from center of spindle to column.....	13 $\frac{1}{4}$ "	15 $\frac{1}{2}$ "	18 $\frac{1}{2}$ "
Maximum distance from spindle to base.....	43"	50"	55"
Maximum distance from spindle to table.....	29"	35"	38"
Vertical adjustment of table.....	18"	14"	13"
Vertical traverse of spindle.....	11"	14 $\frac{1}{2}$ "	16 $\frac{1}{2}$ "
Hole in spindle, Morse taper.....	No. 4	No. 4	No. 5
Total height of machine.....	87"	100"	111"
Diameter of spindle.....	1 $\frac{3}{4}$ "	1 $\frac{7}{8}$ "	2"
Diameter of table.....	22 $\frac{1}{2}$ "	25"	28"
Driving pulleys.....	12" x 3 $\frac{1}{4}$ "	14" x 3 $\frac{1}{2}$ "	16" x 4 $\frac{1}{2}$ "
Speed of bottom shaft, revolutions per minute.....	350	350	350
Net weight.....	1,800 lbs.	2,650 lbs.	3,400 lbs.
Boxed weight.....	2,300 lbs.	3,450 lbs.	4,390 lbs.
Cubic feet.....	82	126	160

Motor drive. By substitution of a constant speed motor, geared direct to the lower driving shaft, for the regular driving pulley, a very efficient electrical drive is obtained.



FIG. 11276.

22 $\frac{1}{2}$ " UPRIGHT DRILL PRESS.

MOTOR DRIVEN.

DESCRIPTION FIG. 11276.

This drill has the driving motor and controller built into the column of the machine. It is geared direct to the spindle for the high speeds and through a back gear for the slow speeds.

Motor has nine speeds, which, in connection with back gear, gives eighteen speeds for drill spindle in geometrical progression from 24 to 440; has friction back gear that may be thrown in or out without stopping.

Power feed has three changes for each speed, and by cone pulleys which are conveniently located, back gears can be thrown in or out without stopping. Power feed is provided with automatic stop.

All gears are accurately cut from solid metal, and the machine is very carefully made throughout.

SPECIFICATIONS.

Drills in center of.....	22 $\frac{1}{2}$ "
Traverse of spindle.....	10"
Maximum distance from spindle to base.....	42"
Maximum distance from spindle to table.....	28"
Minimum distance from spindle to base.....	32"
Minimum distance from spindle to table.....	0"
Smallest diameter of spindle.....	1 $\frac{3}{4}$ "
Weight of machine.....	1,150 lbs.
Weight of machine crated for domestic shipment.....	1,300 lbs.
Weight of machine boxed for foreign shipment.....	1,400 lbs.
Dimensions of box for foreign shipment.....	60" x 39" x 25"
Maximum horse-power of motor.....	1 $\frac{1}{2}$

Motor is wound for a direct current of either 110 or 220 volts.

2', 2½' AND 3' ARM RADIAL DRILLS.

DESCRIPTION FIG. 11280.

These drills are furnished either with or without tapping attachment, as desired.

A swivel table can be supplied, instead of plain table shown in cut.

SPECIFICATIONS.

Drills to the center of	2'	2½'	3'
Traverse of spindle	48"	60"	72"
Diameter of spindle (least section)	1½"	1½"	1½"
Spindle bored to fit Morse taper No.	4	4	4
Minimum distance column to spindle	10½"	13½"	13"
Traverse of saddle on column	30"	26¼"	30½"
Traverse of head on arm	14½"	19¼"	26"
Maximum distance from spindle to base plate	48½"	44"	49"
Size of round table	25"	26"	30"
Total height of machine	90"	87"	92"
Highest position of spindle	97¼"	92"	98"
Size of tight and loose pulleys	12" x 3¼"	12" x 3¼"	12" x 3¼"
Speed of driving pulleys, revolutions per minute	250	250	250
Floor space	78" x 80"	80" x 75½"	90" x 80"
Weight	2,400 lbs.	2,700 lbs.	3,250 lbs.

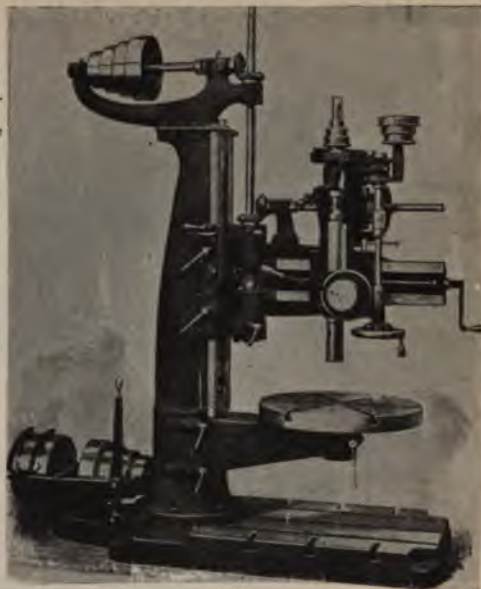


FIG. 11280.

2½' AND 3' RADIAL DRILLS.

DESCRIPTION FIG. 11281.

These machines are peculiarly adapted for light and medium manufacturing, having sufficient power to drill from the solid holes up to 2" in steel and 2½" in cast iron.

Drive is either by gear box, as shown in Fig. 11281, or by cone pulley, as shown in Fig. 11282.

Tapping attachment is part of the regular equipment.

The tables are made in six styles as enumerated on next page, the first of which is shown in Fig. 11281, and the sixth in Fig. 11283. The round table is merely an auxiliary to the box, swiveling and swiveling tables, and may be used or not, as desired, being readily removed. When notched for indexing, these combination tables are very convenient for spacing holes around a center. The machine may also be furnished with an independent round table 3' in diameter, which is fitted with a ball bearing so as to revolve freely by hand under a load.



FIG. 11281.

GEAR SPEED CHANGE VERTICAL DRILLING MACHINES.

SPECIFICATIONS FIGS. 11276 TO 11279.—Continued.

Size of drill.....	20"	30"	30"
Distance from center of spindle to column.....	13½"	15½"	18½"
Maximum distance from spindle to base.....	43"	50"	55"
Maximum distance from spindle to table.....	29"	35"	38"
Vertical adjustment of table.....	18"	14"	13"
Vertical traverse of spindle.....	11"	14½"	16½"
Hole in spindle, Morse taper.....	No. 4	No. 4	No. 5
Total height of machine.....	87"	100"	111"
Diameter of spindle.....	1¾"	1½"	2"
Diameter of table.....	22½"	25"	28"
Driving pulleys.....	12" x 3¼"	14" x 3½"	16" x 4½"
Speed of bottom shaft, revolutions per minute.....	350	350	350
Net weight.....	1,800 lbs.	2,650 lbs.	3,400 lbs.
Boxed weight.....	2,300 lbs.	3,450 lbs.	4,390 lbs.
Cubic feet.....	82	120	160

Motor drive. By substitution of a constant speed motor, geared direct to the lower driving shaft, for the regular driving pulley, a very efficient electrical drive is obtained.



FIG. 11279.

22½" UPRIGHT DRILL PRESS.

MOTOR DRIVEN.

DESCRIPTION FIG. 11279.

This drill has the driving motor and controller built into the column of the machine. It is geared direct to the spindle for the high speeds and through a back gear for the slow speeds.

Motor has nine speeds, which, in connection with back gear, gives eighteen speeds for drill spindle in geometrical progression from 24 to 440; has friction back gear that may be thrown in or out without stopping.

Power feed has three changes for each speed, and by cone pulleys which are conveniently located, back gears can be thrown in or out without stopping. Power feed is provided with automatic stop.

All gears are accurately cut from solid metal, and the machine is very carefully made throughout.

SPECIFICATIONS.

Drills in center of.....	22½"
Traverse of spindle.....	10"
Maximum distance from spindle to base.....	42"
Maximum distance from spindle to table.....	28"
Minimum distance from spindle to base.....	32"
Minimum distance from spindle to table.....	0"
Smallest diameter of spindle.....	1¾"
Weight of machine.....	1,150 lbs.
Weight of machine crated for domestic shipment.....	1,300 lbs.
Weight of machine boxed for foreign shipment.....	1,400 lbs.
Dimensions of box for foreign shipment.....	80" x 36" x 25"
Maximum horse-power of motor.....	1½

Motor is wound for a direct current of either 110 or 220 volts.

2', 2½' AND 3' ARM RADIAL DRILLS.

DESCRIPTION FIG. 11280.

These drills are furnished either with or without tapping attachment, as desired.

A swivel table can be supplied, instead of plain table shown in cut.

SPECIFICATIONS.

Drills to the center of.....	2'	2½'	3'
Traverse of spindle.....	48"	60"	72"
Diameter of spindle (least section).....	15/8"	13/8"	13/8"
Spindle bored to fit Morse taper No.....	4	4	4
Minimum distance column to spindle.....	10½"	13½"	13"
Traverse of saddle on column.....	30"	26¼"	30½"
Traverse of head on arm.....	14½"	19¼"	20"
Maximum distance from spindle to base plate.....	48¼"	44"	49"
Size of round table.....	25"	26"	30"
Total height of machine.....	90"	87"	92"
Highest position of spindle.....	97¼"	92"	98"
Size of tight and loose pulleys.....	12" x 3¼"	12" x 3¼"	12" x 3¼"
Speed of driving pulleys, revolutions per minute.....	250	250	250
Floor space.....	78" x 80"	80" x 75½"	90" x 80"
Weight.....	2,400 lbs.	2,700 lbs.	3,250 lbs.



FIG. 11280.

2½' AND 3' RADIAL DRILLS.

DESCRIPTION FIG. 11281.

These machines are peculiarly adapted for light and medium manufacturing, having sufficient power to drill from the solid holes up to 2" in steel and 2½" in cast iron.

Drive is either by gear box, as shown in Fig. 11281, or by cone pulley, as shown in Fig. 11282.

Tapping attachment is part of the regular equipment.

The tables are made in six styles as enumerated on next page, the first of which is shown in Fig. 11281, and the sixth in Fig. 11283. The round table is merely an auxiliary to the box, swinging and swiveling tables, and may be used or not, as desired, being readily removed. When notched for indexing, these combination tables are very convenient for spacing holes around a center. The machine may also be furnished with an independent round table 3' in diameter, which is fitted with a ball bearing so as to revolve freely by hand under a load.



FIG. 11281.

2 1/2' AND 3' RADIAL DRILLS.

CONE DRIVE AND SWINGING TABLE.

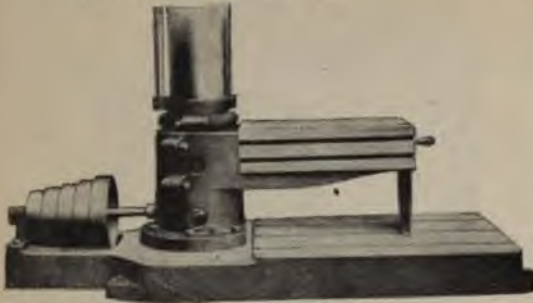


FIG. 112B2.

GEAR DRIVE, WITH SWIVELING AND ROUND TABLES.

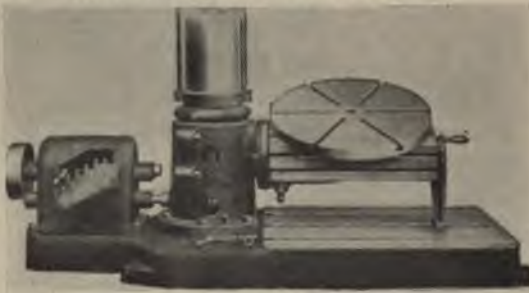


FIG. 112B3.

DESCRIPTION FIG. 112B1.-C

- Styles of tables.
 No. 1, box table.
 No. 2, swiveling table.
 No. 3, swiveling table.
 No. 4, round and box table.
 No. 5, round and swiveling tables.
 No. 6, round and swiveling table.

SPECIFICATIONS.

	2 1/2' Fl.	3'
Base, height	6"	
Base, size of working surface	21 1/2" x 3"	2
Capacity, vertical range of arm	2' 7"	
Capacity, horizontal range of head	21 1/2"	
Capacity, minimum distance column to spindle center	15 1/2"	
Capacity, minimum distance under spindle over base	18"	
Capacity, maximum distance under spindle over base	4' 3"	
Capacity, drills in plane of base to center of	5"	
Capacity, drills in plane of table to center of	8 1/2"	
Column, diameter	9"	
Column, total height from floor	6' 3"	
Cone drive, size of largest step	25/6" x 12"	1
Cone drive, speed and size of tight and loose pulleys	350-248" x 12"	350
Cone drive, maximum number of revolutions to one of spindle	5.75	
Gear drive, size of driving pulley	25/6" x 12"	1
Gear drive, speed and size of tight and loose pulleys	350-248" x 12"	350
Gear drive, maximum number of revolutions to one of spindle	10.73	
Spindle, vertical range	11"	
Spindle, diameter at least section	1 1/2"	
Spindle, bored to fit Morse taper	No. 4	
Spindle, maximum height from floor	7' 8"	
Table, size of working surface of box	16" x 22"	
Table, working surface of swiveling and swiveling	16" x 30"	
Table, height of all three styles	18"	
Weight, net	3,620 lbs.	
Weight, skidded for domestic shipment	3,710 lbs.	

3' ARM STANDARD RADIAL DRILL.

FIGS. 11284 AND 11285.

It is regularly supplied with tapping and plain table, as shown in Fig.

swivel table as shown in Fig. 11285 instead if desired, or a swivel table worm gear may be had. The round table is an accessory which is also supplied and will be found convenient for a lot of work.

The feed gives six changes, as follows: obtained are .007, .0102, .0149, .0218, and $\frac{1}{8}$ of an inch per revolution of the

is powerful, being capable of driving through solid cast iron, a $2\frac{1}{2}$ " drill in steel, or a $2\frac{1}{2}$ " pipe tap in cast iron.



FIG. 11284.



FIG. 11285.

SPECIFICATIONS FIGS. 11284 AND 11285.

Drills to the center of.....	72"
Traverse of spindle.....	12"
Diameter of spindle (least section).....	1 $\frac{5}{8}$ "
Spindle bored to fit Morse taper	No. 4
Minimum distance column to spindle.....	13"
Traverse of saddle on column..	29"
Traverse of head on arm.....	25"
Maximum distance spindle to base.....	51"
Minimum distance spindle to base.....	10"
Size and height of table.....	16" x 30" x 18"
Size of round table.....	23"
Total height of machine.....	7' 8"
Highest position of spindle....	8' 6 $\frac{1}{2}$ "
Size of tight and loose pulleys..	12" x 3 $\frac{1}{4}$ "
Speed of driving pulleys, revolutions per minute.....	230
Face of column.....	9"
Face of arm.....	8"
Spindle speeds obtained are from 375 to 15 revolutions per minute.	
Floor space.....	7' 0" x 8'
Weight.....	3,500 lbs.

3' AND 4' ARM GEAR SPEED CHANGE RADIAL DRILLS.



FIG. 11208.

DESCRIPTION FIG. 11208.

The base is deep, broad and heavily ribbed, and is provided with T slots.

Column is rectangular in form, being broader and heavier toward the bottom than at the top, as shown in cut. This construction gives greater stiffness than any other form of construction of the same weight.

Arm is D sectional and has heavy brass extending from trunnion to outer end of arm. It swings easily on ball bearings and is easily locked in any position. The arm is lowered twice as fast as it is raised, and this may be done without stopping the machine, and without danger of breaking gears.

Head is traversed on arm by means of hand wheel, spiral rack, and pinion. Is provided with holder to lock it in any position.

Spindle is made from crucible steel forging; is counterbalanced, has sixteen changes of speed, arranged in correct geometrical progression, eight changes of feed from .0057" to .054" per revolution of spindle. Has quick return and automatic stop motion.

The gear speed changing device is of the simplest form and has the fewest gears possible for a given number of speeds. It is so arranged that it is impossible to engage conflicting ratios of gears. This removes the possibility of the operator thoughtlessly doing damage to machine. Bearings are large and bushed so that in case it is ever necessary to replace them, the original alignment will be preserved.

All speeds and feeds can be changed instantly while machine is in operation.

Back gears are mounted upon the head for the purpose of removing all severe strain from driving shafts and gears placed elsewhere upon the machine.

The back gears may be engaged or disengaged without stopping the machine and without shock; a feature which saves a great deal of time.

Tapping attachment is part of the machine. The lever is situated on the right hand side of head where it is easiest for the operator to handle. In tapping large holes the back gears would be engaged while running the drill will back out the tap at five times the speed it was run in.

Improved quick return device makes it possible to quick approach or return the spindle and engage or disengage the power feed, all with the same lever and with the use of one hand only.

A novel feature of the automatic stop motion made possible by the construction of the roller clutch, which acts like a ratchet: When starting a drill to drill a hole out of the solid stock, it is advantageous to feed the point of the drill faster than the power feed until the drill is cutting its full diameter. This may be done by turning the hand wheel faster by hand, and when the operator lets go, the power feed immediately takes hold and proceeds with the drilling.

A tilting table may be had, if desired, at extra cost, in place of the plain table shown in cut (see Fig. 11297).

Motors of any type attached direct to the machine at extra cost (see Fig. 11291).

SPECIFICATIONS.

	3'	4'
Diameter of spindle.....	1 1/8"	1 3/8"
Hole in spindle, Morse taper.....	No. 4	No. 4
Traverse of spindle.....	14"	14 1/2"
Traverse of saddle.....	20"	33"
Traverse of head.....	24"	33"
Maximum distance, column to spindle center.....	40 1/2"	47"
Minimum distance, column to spindle center.....	16 1/2"	14"
Maximum distance, spindle to trunnion.....	34 1/2"	40"
Minimum distance, spindle to trunnion.....	10 1/2"	7"
Will drill to center of.....	8 1/2"	9 1/2"
Maximum distance, spindle to base.....	58"	58"
Minimum distance, spindle to base.....	6"	11 1/2"
Driving pulley.....	12" x 35"	12" x 35"
Speed of driving pulley, revolutions per minute.....	350	350
Base plate.....	41 1/2" x 28"	70" x 34"
Available space on base plate.....	43" x 28"	40" x 34"
Table.....	30" x 24" x 22"	24" x 24" x 22"
Height.....	92"	93"
Floor space.....	79 1/2" x 28"	84" x 35"
Weight, net.....	3,380 lbs.	4,400 lbs.
Weight, hoisted.....	3,920 lbs.	5,260 lbs.
Cubic feet.....	97	104

THE BRITISH MACHINE TOOL COMPANY

NOS. 1, 2 AND 3 ORDINARY PLAIN RADIAL DRILL.

DESCRIPTION FIG. 11267.

The back gears, which consist of but three gears and a clutch and may be engaged or disengaged from the front of the head, are so located on the head that the friction rings in the tapping mechanism are obliged to transmit less than one-seventh the pull required at the spindle.

The feeding mechanism, which is patterned after that used on our improved radials, furnishes four rates of feed, advancing by even increments from .008" to .020" per revolution of spindle, each of which, as in these machines, is instantly available by means of our standard dive key which eliminates all loss of time incident to shifting a belt or to operating under a feed of unnecessary fineness.

The spindle is provided with both hand and power feed, quick advance and return, safety stop and hand lever reverse, and has ten changes of speed which, by being made to advance in geometrical progression between the comparatively narrow limits of approximately eight to one, are suitable for drilling economically all work adapted to the capacity of the machine. An engraved plate attached to the arm shows the operator how to obtain the proper speeds for different metals and diameters of drills.

The tapping mechanism, which is identical with that used on our improved radials, is incorporated in the design of the head and permits tapping at any speed with which the machine is provided. It is fitted with friction clutches which, owing to the back gears being located between them and the spindle gear pinion, have extremely light duty to perform, making them both powerful and long lived. These clutches are operated by a lever the handle of which extends around under the arm within convenient reach of the operator and is used for starting, stopping, and reversing the spindle.

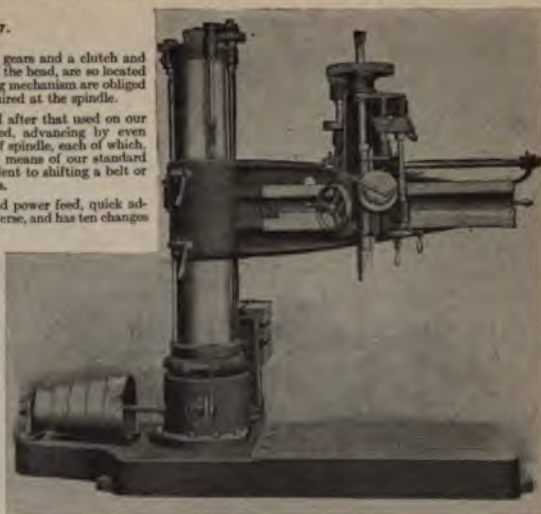


FIG. 11267.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.
Diameter of column.....	11"	13"	15"
Diameter of spindle, least section.....	1 9/16"	2 1/4"	2 5/8"
Spindle bored to fit Morse taper.....	No. 4	No. 5	No. 5
Transverse of spindle.....	17"	17"	19"
Horizontal range of head.....	3' 2"	4' 2"	5' 2"
Receives under spindle, over base.....	5'	5' 0"	6' 6"
Drills work in plane of base to center of.....	8'	10'	12'
Drills work in plane of table to center of.....	8' 6 1/4"	10' 7 1/4"	12' 8 1/4"
Width of driving belt.....	3"	3 1/2"	3 1/2"
Size of tight and loose pulleys.....	3 1/4" x 15"	3 3/4" x 16"	3 3/4" x 18"
Speed of countershaft, revolutions.....	400	400	400
Floor spaced required.....	9' x 11' 7"	10' 6" x 14'	12' x 10' 5"
Weight, net.....	6,200 lbs.	9,900 lbs.	13,600 lbs.

NOS. 1, 2 AND 3 IMPROVED PLAIN RADIAL DRILL.

DESCRIPTION FIG. 11266.

The back gears are fitted with friction clutches, which, without having to stop the machine, give instantly for each position of the driving belt or set of driving gears, four changes of speeds, each of which exerts at the spindle more than double the pulling power of the next faster one.

The spindle has sixteen changes of speed, arranged in geometrical progression, and is provided with both hand and power feed, quick advance and return, safety stop, automatic trip, dial depth gauge and hand lever reverse. An engraved plate attached to the arm shows the operator how to obtain the proper speeds for different metals and diameters of drills.

The depth gauge answers a double purpose; besides enabling the operator to read all depths from zero, which does away with the usual delays concomitant to scaling or calipering, it supplies a convenient means for setting the automatic trip, the graduations showing exactly where each dog should be located in order to disengage the feed at the desired points.

The automatic trip operates at as many different points as there are depths to be drilled at one setting of the work.

NOS. 1, 2 AND 3 IMPROVED RADIAL DRILLS.

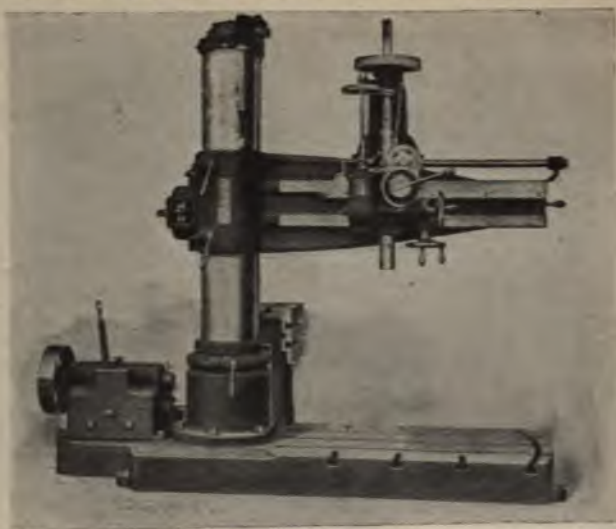


FIG. 11288.

DESCRIPTION FIG. 11288.—Continued.

The feeding mechanism furnishes eight rates of feed, ranging in geometrical progression from .007" to .064" per revolution of spindle, each of which is instantly available, eliminating all loss of time incident to shifting a belt, or to operating under a load of unnecessary momentum.

The tipping mechanism is located on the head, and permits the locking out of taps at any speed with which the machine is provided, regardless of the speed used in driving them in.

The driving mechanism consists essentially of a pulley, four pairs of gears, two friction clutches and an operating lever, by means of which any one of four speeds is instantly available, saving, as in the feed, all loss of time incident to shifting a belt on a cone.

Universal tables are furnished if desired.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.
Diameter of column.....	11"	13"	15"
Diameter of spindle, least section.....	1 7/8"	2 1/4"	2 3/4"
Spindle bored to fit Morse taper.....	No. 4	No. 5	No. 5
Taper of spindle.....	13°	12°	10°
Horizontal range of head.....	3' 5"	4' 5"	5' 5"
Vertical range of arm.....	2' 1"	2' 6"	3' 11"
Receives under spindle, over base.....	3'	3' 5"	6' 0"
Receives under spindle, over floor.....	3' 7"	6' 5"	7' 3"
Drills work in place of base to center of.....	3'	10'	12'
Drills work in place of table to center of.....	8' 4 1/2"	10' 7 1/2"	12' 8 1/2"
Size of table, working surface.....	20" x 20"	24" x 24"	28" x 28"
Size of base, working surface.....	2' x 4' 6"	2' 6" x 3' 6 1/2"	4' x 6' 7"
Distance from floor to highest point of column.....	7' 5"	9' 9 1/2"	9' 11 1/2"
Distance from floor to extreme height of spindle.....	9' 7"	10' 11 1/2"	12' 3 1/2"
Minimum revolutions of driving pulley to one revolution of spindle.....	3713	3868	1,120
Maximum revolutions of driving pulley to one revolution of spindle.....	13.81	15.66	18.04
Diameter of driving pulley.....	16"	16"	16"
Width of driving belt.....	3"	3"	3"
Size of tight and loose pulleys.....	3 1/2" x 16"	3 1/2" x 16"	3 1/2" x 16"
Speed at countshaft, revolutions.....	230	235	240
Floor space required.....	9' 4" x 11' 10"	10' 0" x 14' 2"	11' 8" x 16' 0"
Weight, net.....	6,200 lbs.	9,600 lbs.	13,200 lbs.
Weight, skidded for domestic shipment.....	6,400 lbs.	9,850 lbs.	13,500 lbs.

GEAR SPEED CHANGE RADIAL DRILLING MACHINES.

5', 6' AND 7' ARM.

DESCRIPTION FIG. 11269.

The base is deep, broad and heavily ribbed and is provided with T slots.

Column is rectangular in form, being broader and heavier toward the bottom than at the top, as shown in cut. This construction gives greater stiffness than any other form of construction of the same weight.

Arm is D sectional and has heavy brace extending from trunnion to outer end of arm. It swings easily on ball bearings and is easily locked in any position. The arm is lowered twice as fast as it is raised, and this may be done without stopping the machine, and without danger of breaking gears.

Head is traversed on arm by means of hand wheel, spiral rack, and pinion. It is provided with binder to lock it in any position.

Spindle is made from crucible steel forging; is counterbalanced, has sixteen changes of speed, arranged in correct geometrical progression, eight changes of feed from .0057" to .004" per revolution of spindle. Has quick return and automatic stop motion.

The gear speed changing device is of the simplest form and has the lowest gears possible for a given number of speeds. It is so arranged that it is impossible to engage conflicting ratios of gears. This removes the possibility of the operator thoughtlessly doing damage to machine. Bearings are large and made so that in case it is ever necessary to replace them the original alignment will be preserved.

All speeds and feeds can be changed instantly while machine is in operation.

Back gears are mounted upon the head for the purpose of removing all severe strain from driving shafts and gears placed elsewhere upon the machine.

The back gears may be engaged or disengaged without stopping the machine and without shock; a feature which saves a great deal of time.

Tapping attachment is part of the machine. The lever is situated on the right hand side of head where it is easiest for the operator to handle. In tapping large holes the back gears would be engaged while running the tap in, but as soon as the tap is reversed the back gears can be instantly disengaged, which will back out the tap at five times the speed it was run in.

Improved quick return device makes it possible to quick approach or return the spindle and engage or disengage the power feed, all with the same lever and with the use of one hand only.

A novel feature of the automatic stop motion made possible by the construction of the roller clutch, which acts like a ratchet: When starting a drill to drill a hole out of the solid stock, it is advantageous to feed the point of the drill faster than the power feed until the drill is turning its full diameter. This may be done by turning the hand wheel faster by hand, and when the operator lets go, the power feed immediately takes hold and proceeds with the drilling.

A tilting table may be had, if desired, at extra cost, in place of the plain table shown in cut (see Fig. 11297).

Motors of any type attached direct to the machine at extra cost (see Fig. 11291).

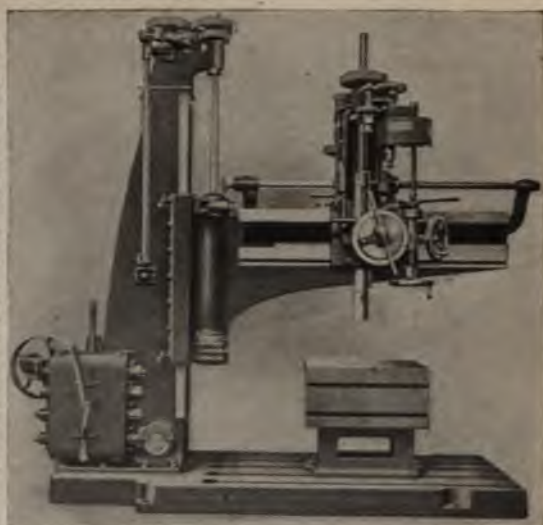


FIG. 11269.

SPECIFICATIONS.

	5' Arm.	6' Arm.	7' Arm.
Diameter of spindle	1 1/4"	2 1/4"	2 1/4"
Hole in spindle, Morse taper	No. 4	No. 5	No. 5
Traverse of spindle	13"	16"	18"
Traverse of saddle	31 1/2"	34"	37"
Traverse of head	40"	52 1/2"	55"
Maximum distance, column to spindle center	61"	75"	80"
Minimum distance, column to spindle center	21"	22 1/2"	25"
Maximum distance, spindle to trunnion	52"	64 1/2"	69"
Minimum distance, spindle to trunnion	12"	14"	14"
Will drill to center of	122"	150"	160"
Minimum distance, spindle to base	60 1/2"	66"	75"
Minimum distance, column to base	14"	16"	20"
Speed of driving pulley, revolutions per minute	350	350	350
Head plate	91" x 36"	112" x 42"	123" x 48"
Available space on base plate	60" x 36"	82" x 42"	88" x 48"
Table	24" x 24" x 22"	27" x 25" x 24"	27" x 25" x 24"
Height	100"	115"	127"
Floor space	102 1/2" x 36"	137" x 42"	136 1/2" x 48"
Weight, net	6,500 lbs.	10,200 lbs.	12,200 lbs.

8' AND 9' ARM PLAIN RADIAL DRILLING MACHINES.



FIG. 11290.

DESCRIPTION FIG. 11290

These drills are similar to those shown on preceding page except that they are driven by cone pulley and countershaft instead of by speed box. They are heavy, powerful tools, designed for the hardest kind of work.

SPECIFICATIONS.

	No. 11. 8' Arm.	No. 12. 9' Arm.
Diameter of spindle.....	3 1/2"	4"
Hole in spindle, Morse taper.....	No. 6	No. 8
Traverse of spindle.....	27"	22"
Traverse of saddle.....	42"	32"
Traverse of head.....	79"	53"
Maximum distance, column to spindle center.....	109"	119 1/2"
Minimum distance, column to spindle center.....	29"	26 1/2"
Maximum distance, spindle to trunnion.....	92"	101 1/2"
Minimum distance, spindle to trunnion.....	16"	18 1/2"
Will drill to center of.....	2 1/2"	2 3/8"
Maximum distance, spindle to base.....	82"	92 1/2"
Minimum distance, spindle to base.....	13"	17 1/2"
Driving pulley.....	18" x 2 1/2"	24" x 6 1/2"
Speed of driving pulley, revolutions per minute.....	350	350
Base plate.....	148" x 54"	168" x 54"
Available space on base plate.....	108" x 54"	113" x 54"
Table.....	27" x 22" x 28"	30" x 42" x 24"
Height.....	148"	174"
Floor space.....	139" x 54"	175" x 54"
Weight, net.....	18,500 lbs.	20,000 lbs.
Weight, boxed.....	20,700 lbs.	20,000 lbs.
Cubic feet.....	342	480

GEAR SPEED CHANGE RADIAL DRILLS,

DESCRIPTION FIG. 11291.

Driven by constant speed electric motor, either direct or alternating current. Any motor, whether slow, moderate, or high speed, may be used, as the first pair of gears can be varied to accommodate the speed of motor. This illustrates our method of attaching an electric motor to our radial drilling machines which we build in eight sizes from 3' to 10' arm.

The motor is supported by a bracket which is bolted to drill post, and drives into the large spur gear shown in cut that in turn drives through the two bevel gears, driving the speed changing mechanism located in speed box.

Sixteen changes of spindle speed are obtained by shifting the three levers shown on speed box, together with the back gear lever which is located on the head.

For additional description and specifications, see Figs. 11286 and 11289.

SEMI-RADIAL DRILL.

DESCRIPTION FIG. 11292.

The chief characteristics of this machine are rigidity, simplicity and durability, which, combined with a high ratio of transmission gears, make it an admirable tool for many classes of work.

The head, on which all bearings are of uncommon length, consists of a single casting and is adjustable on the arm by means of a spiral gear which gives it an easy and quick motion.

MOTOR DRIVEN.

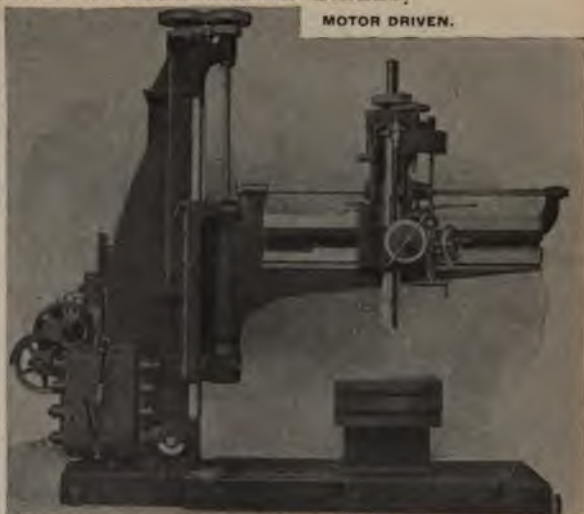


FIG. 11291.

The spindle, which is made of hammered steel and has an unusually great vertical adjustment for a machine of its size, is provided with both hand and power feed and quick advance and return.

The feeding mechanism furnishes three rates of feed, advancing by even increments from .008" to .016" per revolution of spindle, each of which is instantly available by means of our standard dive key.

The driving mechanism contains but seven gears, the pitch and speed of which are conducive to long life. The speeds are five in number and advance in geometrical progression from 50 to 170 revolutions per minute.

The frame may be said to consist of but five parts, the base, column, cap, arm and arm shaft, each of which is commensurate with the continuous severe work expected of a machine of this character.

SPECIFICATIONS.

Diam. spindle, least section . . .	1 1/2"
Spindle bored to fit Morse taper . . .	No. 4
Traverse of spindle	18"
Horizontal range of head	3' 6 3/4"
Maximum distance under spindle over table	24"
Maximum distance under spindle over base	4'
Maximum distance under spindle over floor	4' 7"
Drills work in plane of base to center of	8'
Size of table, working surface	20" x 20"
Size of base, working surface	3' x 4' 1"
Maximum diameter of driving cones	18"
Size of tight and loose pulleys	3 1/2" x 18"
Width of cone belt	3"
Speed of countershaft, R. P. M.	350
Floor space required	9' 3" x 11' 9"
Weight, net	6,500 lbs.



FIG. 11292.

HALF UNIVERSAL RADIAL DRILL.

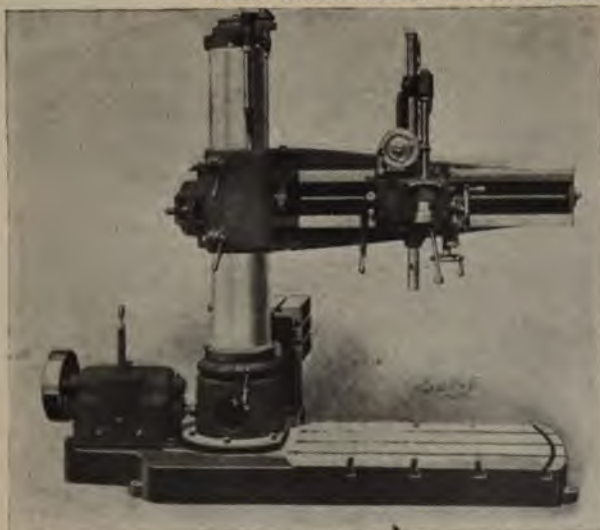


FIG. 11293.

DESCRIPTION FIG. 11293.

The head works at all angles in a vertical plane, is graduated 90° either side of zero, and has an improved locking device which instead of compressing the faces of the arm expands them in the saddle, whereby the combined stresses of twisting and bending are most effectually overcome.

The back gears are fitted with friction clutches, which, without having to stop the machine, give instantly for each position of the driving belt or set of driving gears, four changes of speeds, each of which exerts at the spindle more than double the pulling power of the next faster one.

The spindle has sixteen changes of speed, arranged in geometrical progression, and is provided with both hand and power feed, quick advance and return, safety stop, automatic trip, dial depth gauge and hand lever reverse. An engraved plate attached to the arm shows the operator how to obtain the proper speeds for different metals and diameters of drills.

The depth gauge answers a double purpose: besides enabling the operator to read all depths from zero, which does away with the usual delays concomitant to scaling or calipering, it supplies a convenient means for setting the automatic trip, the gradu-

ations showing exactly where each dog should be located in order to disengage the feed at the desired points. The automatic trip operates at as many different points as there are depths to be drilled at one setting of the work. The feeding mechanism furnishes eight rates of feed, ranging in geometrical progression from .007" to .064" per revolution of spindle, each of which is instantly available, eliminating all loss of time incident to shifting a belt, or to operating under a feed of unnecessary fineness. The tapping mechanism is located on the head, and permits the backing out of taps at any speed with which the machine is provided, regardless of the speed used in driving them in. The driving mechanism consists essentially of a pulley, four pairs of gears, two friction clutches and an operating lever, by means of which any one of four speeds is instantly available, saving, as in the feed, all loss of time incident to shifting a belt on a cone.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.
Diameter of column.....	11"	13"	15"
Diameter of spindle at point power is applied.....	2 $\frac{3}{8}$ "	2 $\frac{1}{2}$ "	2 $\frac{7}{8}$ "
Spindle bored to fit Morse taper.....	No. 4	No. 5	No. 5
Traverse of spindle.....	13"	17"	19"
Horizontal range of head.....	3' 2"	4' 1 $\frac{1}{2}$ "	4' 11"
Vertical range of arm.....	3' 1"	3' 0"	3' 11"
Receives under spindle, over base.....	4' 10"	5' 6 $\frac{1}{2}$ "	6' 3"
Receives under spindle, over floor.....	5' 5"	6' 2 $\frac{1}{2}$ "	7"
Drills work in plane of base to center of.....	8"	10"	12"
Drills work in plane of table to center of.....	8' 6 $\frac{1}{4}$ "	10' 7 $\frac{1}{4}$ "	12' 8 $\frac{1}{4}$ "
Size of table, working surface.....	20" x 20"	24" x 24"	28" x 28"
Size of base, working surface.....	3' x 4' 6"	3' 6" x 5' 6 $\frac{1}{2}$ "	4' x 6' 7"
Least distance between drill and column centers.....	18 $\frac{1}{2}$ "	21 $\frac{1}{2}$ "	24 $\frac{1}{2}$ "
Distance from floor to highest point of column.....	7' 8"	8' 9 $\frac{1}{4}$ "	9' 1 $\frac{1}{2}$ "
Distance from floor to extreme height of spindle.....	9' 6"	10' 8"	11' 10"
Minimum revolutions of driving pulley to one revolution of spindle.....	5713	5908	1130
Maximum revolutions of driving pulley to one revolution of spindle.....	13.91	15.66	18.04
Diameter of driving pulley.....	16"	16"	16"
Width of driving belt.....	3"	3"	3"
Size of tight and loose pulleys.....	3 $\frac{3}{4}$ " x 10"	3 $\frac{3}{4}$ " x 10"	3 $\frac{3}{4}$ " x 10"
Speed of countershaft, revolutions.....	230	235	240
Floor space required.....	8' 10" x 11' 9"	10' 3" x 14' 1"	11' 7" x 16' 4"
Weight, net.....	5,300 lbs.	9,820 lbs.	13,430 lbs.

5' ARM HALF AND FULL UNIVERSAL RADIAL DRILLS.

DESCRIPTION
FIGS. 11294 AND 11295.

These machines have been designed with a view of supplying the demand for a machine which combines accuracy and convenience with efficiency.

The base is very deep and well ribbed, having no projections, making it suitable to have the top of the base level with the floor.

The column is made in box section, and turns on an inside stump, which extends its entire height; it also has a back brace which adds to the stiffness of the tool. The box column turns easily on roller bearings, and can be firmly clamped in any position.

The saddle which carries the radial arm is gibbed to the column, is long and wide, providing ample bearing, and is raised and lowered by power.

The radial arm is of the box girder shape. The arm on the full universal drill is provided with swivel at the inner end, being operated by a worm and worm-gear, which permits of a hole being drilled in any direction.

The spindle is forged from the best steel, counterbalanced by a special device which does away with a weight, and provided with quick return.

The back gears are located inside of the arm and can be thrown in and out while machine is in motion.

The positive geared feed has three changes, by hand or power, and all speeds and feeds are arranged in accurate geometric progression, and can be changed or disengaged instantly.

The reverse mechanism or tapping



FIG. 11294. SHOWS HALF UNIVERSAL.



FIG. 11295. SHOWS FULL UNIVERSAL.

device is so arranged that the spindle may be started in either direction or stopped without shock or jar.

The quick return engages instantly at any point, allowing the point of drill to be brought directly to the work.

All wheels and levers for operating the tool are located on the head directly in front of and always convenient to the operator.

No countershaft is required.

Each drill is regularly supplied with tapping attachment.

SPECIFICATIONS.

Drills to center of.....	120"
Greatest distance from spindle to base.....	60"
Diameter of spindle.....	2 3/4"
Taper hole in socket, Morse taper.....	No. 5
Traverse of spindle.....	18"
Traverse of saddle.....	44"
Traverse of head on arm.....	38"
Table.....	22" x 22"
Height of table.....	22"
Width of belt on cone.....	3 1/2"
Tight and loose pulleys, diameter.....	16"
Tight and loose pulleys, face.....	4"
Tight and loose pulleys, speed.....	325
Total height of drill.....	10' 7"
Floor space.....	120 1/2" x 174"
Weight, net.....	10,500 lbs.

Note: We are prepared to furnish drills of similar pattern having 4' or 6' arm. Complete information will be sent on application.

FULL UNIVERSAL RADIAL DRILL.

DESCRIPTION FIG. 11296.

The sleeve is mounted on a stationary stump, which extends up to and has a bearing at the top of the machine. This is equivalent to a double column, and affords that stiffness which is so essential to true work.

The head works at all angles radiating from the center of a sphere, is graduated and has an improved locking device which instead of compressing the faces of the arm expands them in the middle, whereby the combined stresses of twisting and bending are most effectually overcome.

The back gears are fitted with friction clutches, which, without having to stop the machine, give instantly for each position of the driving belt or set of driving gears, four changes of speeds, each of which exert at the spindle more than double the pulling power of the next faster one.

The spindle has sixteen changes of speed, arranged in geometrical progression, and is provided with both hand and power feed, and quick advance and return, safety stop, automatic trip, dial depth gauge and hand lever reverse. An engraved plate attached to the arm shows the operator how to obtain the proper speeds for different metals and diameters of drills.

The depth gauge answers a double purpose: besides enabling the operator to read all depths from zero, which does away with the usual delays concomitant to scaling or calipering, it supplies a convenient means for setting the automatic trip, the graduations showing exactly where each dog should be located in order to disengage the feed at the desired point.

The automatic trip operates at as many different points as there are depths to be drilled at one setting of the work; in addition, it leaves the spindle free, after any intermediate tripping, to be advanced, or raised or advanced, or traversed its full length, without disturbing the setting of the dogs; it also throws out the feed when the spindle reaches its limit of movement.

The feeding mechanism furnishes eight rates of feed, ranging in geometrical progression from .007" to .064" per revolution of spindle, each of which is instantly available, eliminating all loss of time incident to shifting a belt, or to operating under a feed of unnecessary fineness. An engraved plate attached to the head shows the operator how to obtain each of the feeds.

The tapping mechanism is incorporated in the design of the head, and permits the backing out of taps at any speed with which the machine is provided, regardless of the speed used in driving them in. It is fitted with a friction clutch operated by a lever which projects down across the face of the arm and is used for starting, stopping, and reversing the spindle.

The driving mechanism consists essentially of a pulley, four pairs of gears, two friction clutches and an operating lever, by means of which any one of four speeds is instantly available, saving, as in the feed, all loss of time incident to shifting a belt on a cone, and making it possible to set the machine, without alteration, at right angles to the line shafting, or to drive it from below the floor when it is desired that the arm should be free to describe a complete circle.

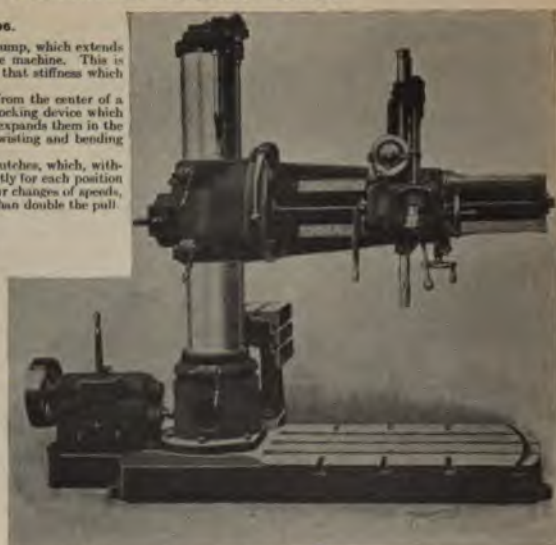


FIG. 11296.

SPECIFICATIONS.

	No. 1	No. 2	No. 3
Diameter of column.....	11"	12"	15"
Diameter of spindle at point power is applied.....	2 3/4"	2 3/4"	2 3/4"
Spindle bored to fit Morse taper.....	No. 4	No. 5	No. 5
Traverse of spindle.....	15"	17"	19"
Horizontal range of head.....	2' 8"	3' 6 1/2"	4' 5"
Vertical range of arm.....	3' 1"	3' 6"	3' 11"
Receives under spindle, over base.....	4' 10"	3' 6 1/2"	6' 3"
Receives under spindle, over floor.....	5' 5"	6' 2 1/2"	7"
Drills work in plane of base to center of.....	8"	10"	12"
Drills work in plane of table to center of.....	8' 6 1/2"	10' 7 1/2"	12' 8 1/2"
Size of table, working surface.....	20" x 20"	24" x 24"	28" x 28"
Size of base, working surface.....	3' x 4' 6"	3' 6" x 5' 6 1/2"	4' x 6' 7"
Distance from floor to highest point of column.....	7' 8"	8' 9 1/2"	9' 11 1/2"
Distance from floor to extreme height of spindle.....	9' 6"	10' 7 1/2"	11' 9"
Minimum revolutions of driving pulley to one revolution of spindle..	.6713	.9808	1.130
Maximum revolutions of driving pulley to one revolution of spindle..	13.91	15.66	18.04
Diameter of driving pulley.....	16"	16"	16"
Width of driving belt.....	3"	3"	3"
Size of tight and loose pulleys.....	3 3/4" x 16"	3 3/4" x 16"	3 3/4" x 16"
Speed of countershaft, revolutions.....	234	236	238
Floor space required.....	8' 10" x 11' 9"	10' 1 1/2" x 14' 2"	11' 5" x 16' 7"
Weight, net.....	6,300 lbs.	about 9,650 lbs.	about 13,000 lbs.

UNIVERSAL TILTING TABLE FOR RADIAL DRILL.

DESCRIPTION FIG. 11297.

This table was designed primarily for use with radial drills shown in Figs. 11286 and 11289, but can be used with equal satisfaction on any design of radial drill.

Made in two sizes:

Size No. 1. Suitable for use with 3' or 4' arm radial drill.

Top surface..... 23 $\frac{1}{4}$ " x 22"
 Side surface..... 22" x 20 $\frac{1}{4}$ "

Size No. 2. Suitable for use with 5', 6' or 7' arm radial drill.

Top surface..... 27" x 23"
 Side surface..... 27" x 22 $\frac{1}{4}$ "



FIG. 11297.

RADIAL DRILLING AND COUNTERSINKING MACHINE.



FIG. 11298.

DESCRIPTION FIG. 11298.

This machine is designed for use in boiler shops and shipyards, for drilling and countersinking large steel plates. These plates can be laid upon the floor, or bench underneath the machine. The radial arm is supported by one long, heavily ribbed wall plate, or bracket, for the purpose of bolting to a post or to the wall. It is placed at a sufficient distance from the floor for the operator to pass under. The radial arm swings easily upon ball bearings. The spindle is brought to any position, either by swinging the arm or by moving the head, carrying the spindle along the arm, both movements being easily accomplished. The spindle is fed by a long hand lever, and counterbalanced by a spiral spring. The driving shaft is adjustable, for the purpose of belting from the main line, at either side of the post or in the position shown in illustration.

SPECIFICATIONS.

Extreme length of machine, 15' 6". Maximum distance from post to spindle, 14'. Minimum distance from post to spindle, 3'. Maximum distance from under side of radial arm to end of spindle, 40". Minimum distance from under side of radial arm to end of spindle, 33". Vertical traverse of spindle, 7". Diameter of spindle, 2 $\frac{3}{4}$ ". Hole in spindle, Morse taper No. 4. Traverse of head on radial arm, 11". Length of wall plate, 6' 10". Width of wall plate, 14". Tight and loose pulleys on driving shaft, 16" in diameter by 4 $\frac{1}{4}$ " face. Speed of countershaft, 120 revolutions per minute. Weight, 2,550 lbs. Boxed weight, 3,250 lbs. 94 cubic feet.

UPRIGHT DRILLS.

NO. 0 DRILL.



FIG. 11299.

DESCRIPTION FIG. 11299.

Will Drill from $\frac{1}{8}$ " to $\frac{3}{4}$ " Hole.

This machine is designed for light drilling.

Diameter of spindle, $1\frac{1}{4}$ ".

Length, 10".

Will drill a $\frac{3}{4}$ " hole to center of 10" circle 2" deep.

The greatest distance from spindle to table, 10".

The drill socket screws on to the spindle and takes drill with $\frac{1}{2}$ " round shank. It can be removed and our No. 51 universal chuck put on in its place, which would be extra.

It has a swing table 7" diameter and automatic feed.

Length, 40".

Net weight, 90 lbs.

Gross weight, 130 lbs.

DESCRIPTION FIG. 11300.

Will Drill from $\frac{1}{8}$ " to $1\frac{1}{4}$ " Hole.

Diameter of spindle, $1\frac{1}{2}$ ".

Length of spindle, 12".

Will drill a $1\frac{1}{4}$ " hole to center of 11" circle $2\frac{1}{2}$ " deep.

Greatest distance from spindle to table, 12".

The drill socket screws onto the spindle and takes drills with $\frac{3}{2}$ " round shank.

It can be removed and our No. 51 universal chuck put on in its place. The chuck would be extra.

It has positive automatic feed, which can be adjusted to four rates of speed. It has swing table 8" diameter, also a grinding attachment with rest for grinding the bit correctly.

Total length, 47".

Net weight, 120 lbs.

Gross weight, 164 lbs.

Size of box, $47" \times 16" \times 11"$.

NO. 1X DRILL.



FIG. 11300.

NO. 3 DRILL.



FIG. 11301.

DESCRIPTION FIG. 11301.

Will Drill from $\frac{1}{8}$ " to $1\frac{1}{2}$ " Hole.

This machine is designed for carriage makers and heavier blacksmith work. In general design it resembles the No. 2. It is built heavier and has larger capacity.

Diameter of spindle, $1\frac{3}{8}$ ".

Length, 15".

Will drill a $1\frac{1}{2}$ " hole to center of 16" circle, $4\frac{1}{2}$ " deep.

Greatest distance from spindle to table, 22".

The drill socket screws on to the spindle, and takes drill with $\frac{1}{1}$ " round shank. It can be removed and our No. 52 universal chuck put on in its place. The chuck would be extra.

This drill has the automatic feed, a swing table 11" in diameter, and grinding attachment.

This drill has been changed so that two speeds are obtained without changing the crank; this also gives high speed on the balance wheel all the time; the change is made in an instant by turning the little lever to the right or left.

Length, 60".

Net weight, 200 lbs.

Gross weight, 262 lbs.

Size of box, $60" \times 20" \times 13"$.

DESCRIPTION FIG. 11302.

This machine is substantially the same as the No. 3, except that it is arranged for operation by both hand and power.

NO. 5 DRILL.



FIG. 11302.

NO. 13 IMPROVED UPRIGHT POWER DRILL.

LEVER FEED.

DESCRIPTION FIG. 11303.

The cut represents a power drill, with lever feed, fastened to tubular iron column. It is a very suitable machine for blacksmith and other shops where power is used. It is furnished with a square table and forked footpieces, or with round table and footpiece, as shown in cut, as desired. Drills to the center of 19" circle. Greatest distance between table and spindle, 21"; traverse of spindle, 8". Spindle is fitted for 1 1/4" straight shank drills, or 1/2" if desired and can be made to take taper or square shank at small advance in cost. It has mechanical device for raising and lowering table. Three step cone pulley, 8 1/2", 6 1/2", 4 1/2", for 2 3/4" belt. Tight and loose pulleys on countershaft, 10", for 2 1/2" belt.

Length, 63".

Weight, 330 lbs.

Boxed for export, 64 1/2" x 28" x 15", 420 lbs.

NO. 14 IMPROVED UPRIGHT POWER DRILL.

WITH WHEEL HOLDING ATTACHMENT.

DESCRIPTION FIG. 11304.

The illustration represents No. 14 drill for blacksmiths and carriage makers, being fitted with a removable wheel holding attachment, on which wheels are quickly revolved when drilling holes in tires. Wheels of various dimensions can be brought in contact with drill bit by raising or lowering the table arm to which the wheel holder is attached.

Can be furnished with or without wheel holder, as desired.



FIG. 11304.

NO. 15 IMPROVED OVERHEAD OR HANGING DRILL.

DESCRIPTION FIG. 11305.

When placed on a wall the distance from wall to spindle is 19 1/2". When placed on a cross beam or hanging post, work of any dimensions can be brought under the drill. Entire length of drill, 30".

Weight, 400 lbs.

Boxed for export, 38" x 30" x 18", 475 lbs.

Made in three styles:

Style 1, with countershaft and lever feed.

Style 2, with countershaft and screw feed.

Style 3, with countershaft, lever and screw feed combined.

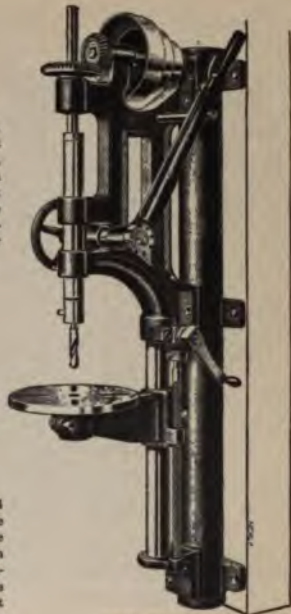


FIG. 11303.

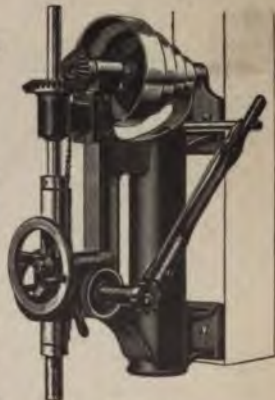


FIG. 11305.

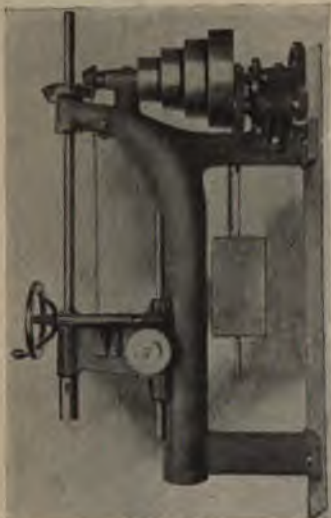


FIG. 11306.

COMBINED 20" AND 56" POST DRILL.

DESCRIPTION FIG. 11306.

Head is vertically adjustable on column. Head and spindle are counterbalanced. Hand wheel feed and quick return motion. Countershaft accompanies this machine.

SPECIFICATIONS.

Traverse of spindle, 18". Distance from post to center of spindle, 28"; from column, 10". Diameter of spindle, 1 1/2". Hole in spindle, Morse taper No. 3. Width of cone belt, 2 1/4". Counter pulleys, 11" x 3 1/4". Speed of countershaft, 225. Required space on post, 30" x 6". Weight, about 500 lbs. Boxed weight, 750 lbs.

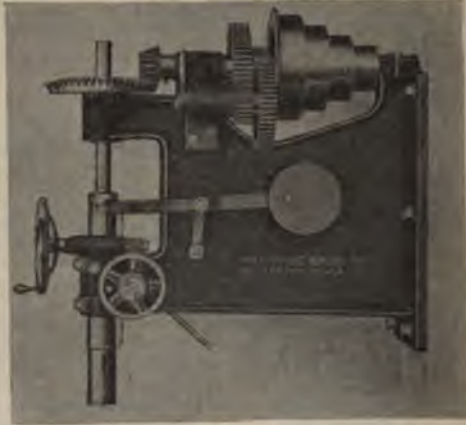


FIG. 11307.

BOILER MAKERS' DRILLING MACHINE.

DESCRIPTION FIG. 11307.

It is bolted to a post or wall at any required distance from the floor. Especially designed for heavy work, it is most substantially built, the gearing particularly being very large. The pinion wheel which engages the rack on quill is not driven on or keyed to its shaft, but is, with its shaft, made of one solid piece of steel. This construction gives great strength to the pinion to resist heavy strains. The worm is of hardened steel, running in a bronze worm gear of coarse pitch. The rack on quill is steel and is strongly bolted to it. It has a counterbalanced spindle and quick return motion. The feed is by hand wheel and worm gearing. Capacity, 3" holes in wrought metal. Countershaft accompanies machine.

SPECIFICATIONS.

Distance from post to center of spindle, 38 1/4". Traverse of spindle, 10 1/2". Diameter of spindle in bearing, 2 1/4". Hole in spindle, Morse taper No. 5. Width of belt on cone, 3". Driving pulleys, 14" x 4". Speed of countershaft, 200 revolutions per minute. Space required on post or wall for frame of machine, 36 1/2" x 14". Weight, 1,500 lbs. Boxed weight, 1,680 lbs. 37 cubic feet.



FIG. 11208.

SUSPENSION DRILLING MACHINE.

DESCRIPTION FIG. 11208.

It is suspended from the ceiling or overhead timbers and bolted thereto. There is nothing in this machine to interfere with any work that may be brought under it. The frame is rigid, in one casting, and needs no truss rods to support it. The spindle is counterbalanced, has hand and power feed, quick return movement, and three changes of feed. Power feed throws in by quick return lever. Capacity, 2" holes. Countershaft accompanies machine.

SPECIFICATIONS.

Traverse of spindle, 19". Diameter of spindle, 2". Hole in spindle, Morse taper No. 4. Distance from ceiling to lower end of spindle, when spindle is at its greatest height, 70". Ceiling space required to fasten frame, 30" square. Counter pulleys, 14" x 4". Speed of countershaft, 200 revolutions per minute. Weight, 1,800 lbs. Boxed weight, 2,200 lbs. 54 cubic feet.

14" MANUFACTURERS' GANG DRILL.
WITH SELF OPERATING SPINDLES.

DESCRIPTION FIG. 11309.

We build our 14" manufacturers' drill in 2, 3, 4, 5, and 6 spindle styles.

This machine is similar in design to our 20" manufacturers' drill, being especially adapted for rapid drilling and reaming on multiple pieces of work.

The spindles are independent and self-operating. There are no time consuming feed levers to manipulate. The operator has only to trip the throw-in lever (which takes but a second) and immediately the spindle drops to the work, feeds through or to the required depth at proper speed, then quickly returns where it awaits tripping for the next operation; or by removal of a stop pin in the cam, the spindle can be made to maintain a continuous performance, that is, instead of stopping upon the return, it again descends for another operation.

The stops are so arranged that the spindles can be set to start and stop at any point within the limit of travel.

Each spindle has independent speeds and feeds.

The table is raised and lowered by a single screw centrally located, as shown in cut. The table has T slots and grooved rim for oil drip, and when required we can equip the machine with oil pump attachment.

The advantage of this gang drill will be readily seen. The operator is kept busy feeding it with work, while the machine does the rest.

It is a great time and labor saver.



FIG. 11309

Height of drill.....	67"
Distance from center to center of spindles.....	12"
Diameter of spindles.....	8 1/2"
Hole in spindle conforms to Morse taper.....	No. 2
Each spindle will drill to the center of a circle.....	13"
Vertical travel of spindle.....	8"
Vertical travel of table.....	16 1/2"
Size of table, planed surface, two spindle drill.....	10" x 24"
Size of table, planed surface, three spindle drill.....	10" x 36"
Size of table, planed surface, four spindle drill.....	10" x 48"
Size of table, planed surface, five spindle drill.....	10" x 60"
Size of table, planed surface, six spindle drill.....	10" x 72"
Greatest distance from spindle to table.....	24"
Diameter of large pulley on cone.....	8"
Diameter of small pulley on cone.....	2 1/2"

SPECIFICATIONS.

Cone pulleys carry belt.....	1 1/2"
Diameter of crown gear.....	3 3/8"
Diameter of bevel pinion.....	2 1/8"
Size of tight and loose pulleys.....	8" x 2"
Speed of tight and loose pulleys for ordinary work, revolutions per minute.....	600
*Floor space required, two spindle drill.....	40" x 27"
*Floor space required, three spindle drill.....	40" x 39"
*Floor space required, four spindle drill.....	40" x 51"
*Floor space required, five spindle drill.....	40" x 63"
*Floor space required, six spindle drill.....	40" x 75"
Weight, two spindle drill, net, 950 lbs., crated, 1,060 lbs.	
Weight, three spindle drill, net, 1,250 lbs., crated, 1,335 lbs.	
Weight, four spindle drill, net, 1,740 lbs., crated, 1,900 lbs.	
Weight, six spindle drill, net, 2,660 lbs., crated, 2,900 lbs.	

* The figures given for required floor space cover room taken by countershaft.



FIG. 11310.

AUTOMATIC REVOLVING CHUCK.

DESCRIPTION FIG. 11310.

This automatic chuck can be used on any of our 14" and 20" manufacturers' drills now on the market.

Our manufacturers' drills have independent, self-operating spindles, and together with these new chucks attached make completely automatic drilling machines. The automatic chuck will work in an upright or horizontal position or at any angle that may be required. It revolves and spaces automatically for equidistant holes in a circle, or for holes of unequal distances, provided no two holes are more than a half circle apart.

This chuck is especially built for use on our manufacturers' drills for drilling holes in single pieces or in any number of small separate pieces that can be set in a circular jig for holding same; in fact the chuck can be used advantageously on a large variety of work and will do it faster than any drill on the market to-day.

The whole machine is so simple that a boy can run it. The only limit to the amount of work it will do is the time it takes the operator to change the pieces.

20' MANUFACTURERS' GANG DRILL.

SELF-OPERATING SPINDLES.



FIG. 11311.

DESCRIPTION FIG. 11311.

A drill that does all but placing the work in the jigs.

We build our 20' manufacturers' drill regularly in two, three, four and six spindles.

This machine is entirely new in design and construction, being adapted particularly for manufacturing plants having multiple pieces of work to be rapidly drilled or reamed or both.

Each complete operation of a spindle is controlled by one lever. This lever starts the drill, and immediately the spindle rapidly descends to the work, feeds through or to required depth at proper speed, then quickly returns automatically, where it awaits the next operation; or by removal of a certain stop pin, the spindle instead of stopping upon return, will again descend and so on, thus keeping up a continuous operation. We can furnish any or all of the spindles with back gearing when required.

The spindles are driven separately from quarter turn countershafts, giving independent speeds as well as independent feeds. When desired we can furnish single belt drive with friction clutch for each spindle.

The table is raised and lowered by a single screw centrally located, as may be seen in the cut. The table has T slots and grooved rim for oil drip, and if required, we can equip the machine with oil pump attachment.

A mechanic can readily see the advantage of this machine. The operator is kept busy taking work to and from his jigs; the machine does the rest. It can be adapted to do a large variety of work, both quickly and accurately. As an economizer of time and labor, this machine is far ahead of any drill on the market. We guarantee it to produce more work than any other drill of its size.

SPECIFICATIONS.

Height of drill.....	74"	Diameter of crown gear.....	5 3/4"
Distance from center to center of spindles.....	15"	Diameter of bevel pinion.....	3 1/4"
Diameter of spindle.....	1 3/8"	Size of tight and loose pulleys.....	10" x 2 1/2"
Hole in spindle conforms to Morse taper.....	No. 3	Speed of tight and loose pulleys for ordinary work, revolutions per minute.....	250
Vertical travel of spindle.....	12"	*Floor space required, two spindle drill.....	48" x 40"
Vertical travel of table.....	14"	*Floor space required, three spindle drill.....	48" x 46"
Each spindle will drill to center of a circle.....	19"	*Floor space required, four spindle drill.....	48" x 60"
Size of table, planed surface, two spindle drill.....	14" x 30"	*Floor space required, six spindle drill.....	48" x 90"
Size of table, planed surface, three spindle drill.....	14" x 45"	Wgt., two spindle drill 1,650 lbs. net, 1,800 lbs. crated, 2,300 lbs. boxed	
Size of table, planed surface, four spindle drill.....	14" x 60"	Wgt., three spindle drill 2,250 lbs. net, 2,400 lbs. crated, 3,200 lbs. boxed	
Size of table, planed surface, six spindle drill.....	14" x 90"	Wgt., four spindle drill 3,250 lbs. net, 3,400 lbs. crated, 4,450 lbs. boxed	
Greatest distance from spindle to table.....	26"	Wgt., six spindle drill 4,530 lbs. net, 4,800 lbs. crated, 6,500 lbs. boxed	
Diameter of large pulley on cone.....	8 3/4"		
Diameter of small pulley on cone.....	4"		
Cone pulleys carry belt.....	2 1/4"		

*The figures given for required floor space cover room taken by countershaft.

STATIONARY SPINDLES.



FIG. 11312.

AUXILIARY SPINDLE ATTACHMENTS.

DESCRIPTION FIGS. 11312 AND 11313.

We furnish these attachments with two or more spindles, and they are made in proper sizes for our various drills and gangs, particularly for our 14' and 20' manufacturers' drills.

They are very useful and time saving devices where it is desired to drill two or more holes at a time on one spindle.

These attachments are made with stationary spindles, or with adjustable spindles, according to work for which they are required.

ADJUSTABLE SPINDLES.



FIG. 11313.

THE FAIRBANKS COMPANY

23" SLIDING HEAD GANG DRILL.

DESCRIPTION FIG. 11314.

The machine illustrated herewith is our new 23" sliding head gang drill, which is furnished with two, three and four spindles.

It has the same driving power and drilling capacity as our 23" stationary head gang drill.

The sliding heads provide for adjustment to suit variations in heights of work. Each spindle has a back brace making it very strong and rigid. Left hand spindle is shown with reversing friction countershaft for tapping.

We furnish any or all of the spindles in the following arrangements: plain lever, wheel and lever, or power feed and automatic stop (including wheel and lever), and with or without back gears, as desired.

The spindles are driven separately from quarter-turn countershafts, thus giving independent speeds and independent feeds.

Reversing friction countershaft for tapping may be furnished at additional cost, for either or both outside spindles. When required, oil pump attachment will also be supplied at extra charge.

SPECIFICATIONS.

Height of drill.....	85 $\frac{1}{4}$ "
Distance from center to center of spindles...	20"
Diameter of spindles.....	1 $\frac{1}{2}$ "
Hole in spindle conforms to Morse taper.....	No. 3
Vertical travel of spindle.....	12"
Vertical travel of table.....	14"
Vertical travel of sliding head.....	18"
Size of table, planed surface, two spindle drill.....	16" x 40"
Size of table, planed surface, three spindle drill.....	16" x 60"
Size of table, planed surface, four spindle drill.....	16" x 80"
Greatest distance from spindle to table.....	33"
Diameter of large pulley on cone.....	10"
Diameter of small pulley on cone.....	4"
Cone pulleys carry belt.....	2 $\frac{1}{2}$ "
Diameter of crown gear.....	7 $\frac{1}{2}$ "
Diameter of level pinion.....	3 $\frac{1}{2}$ "
Speed of tight and loose pulleys, for ordinary work, revolutions per minute.....	250
Size of tight and loose pulleys.....	10" x 3"
*Floor space required, two spindle drill.....	53" x 45"

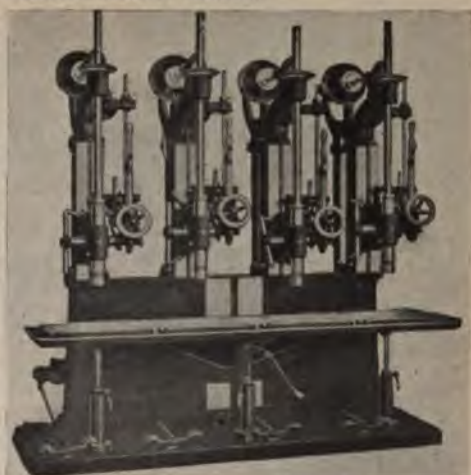


FIG. 11314.

Floor space required, three spindle drill..... 53" x 65"
 Floor space required, four spindle drill..... 53" x 83"
 Weight, three spindle drill, net, 4,400 lbs.; crated, 4,650 lbs.

* The figures given for required floor space cover room taken by countershaft.

RAIL DRILLING MACHINE.

DESCRIPTION FIG. 11315.

It has hand and power feed, quick return motion and counterbalanced spindles. Spindles are adjustable vertically and they are independently fed. The outer spindles can be brought to within 3" and 4 $\frac{1}{2}$ " respectively of the center spindle. The center spindle has no lateral adjustment. It has a vise for holding the rail. Countershaft accompanies this machine.

SPECIFICATIONS.

Distance between center and left hand spindle, maximum, 11"; minimum, 3". Distance between center and right hand spindle, maximum, 17"; minimum, 4 $\frac{1}{2}$ ". Distance, spindle to table, maximum, 13"; minimum, 6 $\frac{1}{2}$ ". Traverse of spindle, 6 $\frac{1}{4}$ ". Diameter of spindle, 2". Diameter of nose of spindle, 2 $\frac{3}{4}$ ". Cone belt, 3 $\frac{1}{2}$ ". Driving pulleys, 18" x 5". Speed of countershaft, 225 revolutions per minute. Weight, 4,500 lbs. Boxed weight, 5,600 lbs. 108 cubic feet.

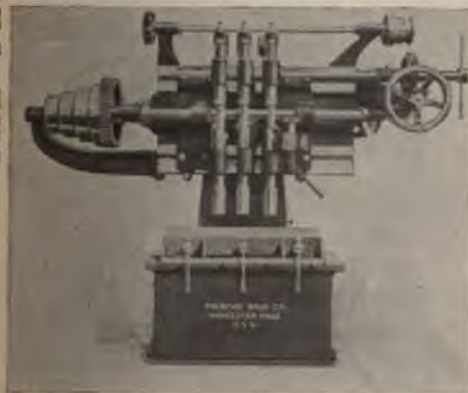


FIG. 11315.

DUPLEX BOILER SHELL DRILL.

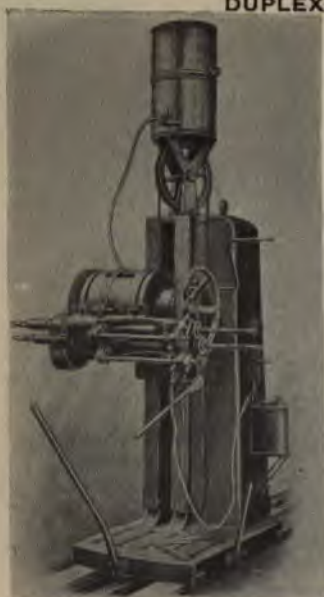


FIG. 11316.

DESCRIPTION FIG. 11316.

In this type of machine, the boiler shell is placed horizontally upon four or six rollers in front of the tool, then by adjusting the spindles horizontally at the height of the center line or pointing toward the center line, and turning the shell, all the holes in the circular seams can be reached, and by moving the upright along the bed all the holes in the longitudinal seams can be drilled.

The machine, as seen in accompanying cut, consists of a cast iron bed, of any length desired, and mounted thereon is an upright, which, by means of a lever and ratchet arrangement, can be easily moved along the bed.

The upright carries a swivel slide to which is fastened the drilling head, the whole being counterweighted so that it can be easily moved vertically upon the upright by means of a rack and pinion operated by a ratchet wrench.

The drilling head consists of an electric motor, around the circumference of which are moved and fastened the spindle frames; the motor being of the enclosed type, is well adapted to boiler shop use, as it is practically dust and waterproof. It is furnished with roller bearing and end ball thrust so that it can be run in the vertical position, and in connection with the back gearing the spindles can be run at ten different speeds for different sized drills. The spindle frames are held firmly to the motor by V gibs at the ends and bolts locked in T slots around it. They are easily moved in setting by means of a ring gear around the motor and pinions on the spindle frames by which they can be moved singly or both together.

DIMENSIONS OF MACHINE.

Horizontal range is limited only by length of bed, which in a standard machine is 20'; vertical range of drilling head on upright is 4½', the spindles in the highest position being 7' above the base of the tool; the drilling head is fitted with spindles 2" in diameter, bored to fit a No. 4 Morse taper shank; the spindles have a traverse of 15" and are furnished with an automatic feed arrangement giving them .004" to .07" advance per revolution. They can be run at ten different speeds between 35 and 150 revolutions per minute, and can be adjusted between from 4° to 17° between centers.

Net weight of machine, one upright, 9,000 lbs

BOILER SHELL DRILLING MACHINE.

DESCRIPTION FIG. 11317.

It has a vertically adjustable cross rail, carrying one or more drilling heads and spindles. These heads are movable laterally on the cross rail by a rack and pinion. They have a transverse adjustment upon the arms by a screw, and can be inclined to any degree by a worm and worm gear. The heads are back geared and have power and hand feed and a quick return. The spindles are driven by a rope belt from an overhead countershaft. Included with the machine are a countershaft and 50' of rawhide rope belt for each spindle. This machine is designed for drilling rivet holes in boilers, after they are rolled to the required shape. The boiler shell is placed in front of the machine, and rotated to the position desired for the drilling of successive holes. It is also used for drilling and tapping stay bolt holes and cutting flue holes in tube sheets. For other purposes, an ordinary drilling table is used, upon which work can be placed. The arms carrying the heads can be made of sufficient length to give a 24" transverse movement of the heads. A machine so constructed would be capable of performing work such as is usually done on a radial drill.

SPECIFICATIONS

Distance between housings, 13' 1". Vertical adjustment of cross rail, 6". Transverse adjustment of heads, 2' to 24" as desired. Extreme height of machine, 10' 2". Floor space required, 15' 6" by 6". Weight of four-head machine, 17,000 lbs.



FIG. 11317.

SIX SPINDLE GANG DRILL WITH MOVABLE TABLE.

DESCRIPTION FIG. 1318.

The heads are movable laterally upon the rail. Each spindle is counter-balanced and has independent vertical adjustment, for varying lengths of drills. They are driven by gearing from the top shaft, and controlled by clutches, which are actuated by a handle, placed in front of each head within easy grasp of the operator. The machine has hand and power feed. It has a quick approach and return movement, operated by a lever, by which all the drills can be instantly lowered to, or raised from, the work together. The feed motion is universal, but any of the spindles can be disconnected at will, making any portion of them independent of the others. Three changes of feed are provided, and change gears can be supplied to give any required feed. The tables have both a lateral and transverse movement. The lateral movement is by a hand wheel and screw. The wheel is graduated and provided with a stop. Each graduation of the wheel represents a table movement of $\frac{1}{16}$ " one revolution of the wheel, a table movement of $\frac{1}{4}$ ". It also has a transverse movement of 8", by means of a lever and gearing. By this arrangement holes can be accurately spaced. This machine can be supplied with an automatic trip and stop motion for determining the depth of drilled holes. This machine is capable of drilling $1\frac{1}{2}$ " holes through 6" of wrought iron or steel plate.

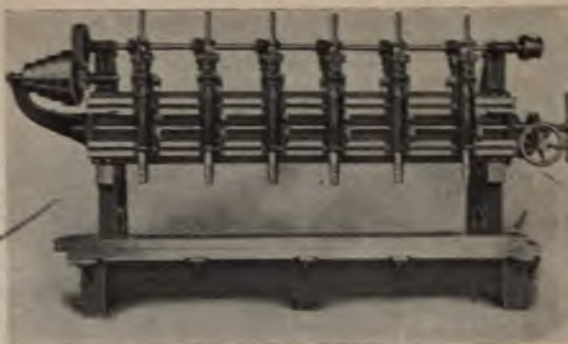


FIG. 1318.

SPECIFICATIONS.

Maximum distance, spindles to table, 18"; minimum, 6". Transverse of spindles, 12". Maximum distance between spindle centers, 8" or 10". Distance, center to center outside spindles, 9' 10". Diameter of spindles, 2". Cone belt, $4\frac{1}{2}$ ". Distance between housings, 11". Floor space, 13' 6" x 4". Driving cone and arm overhang, 3". Height, 7' 10". Weight, 12,500 lbs. Bored weight, 16,000 lbs. 304 cubic feet.

12" MULTIPLE DRILL.



FIG. 1319.

DESCRIPTION FIG. 1319.

The spindles have six changes of speed with three changes of feed for each speed, and are provided with both hand and power feed, quick advance and return, and automatic trip.

The heads are composed of the least number of parts consistent with durability and convenience of operation, are adjustable on the rail and may be used independently or collectively, as desired, each head being complete in every particular.

The back gears are located inside of the cone, and are so arranged that they may be instantly engaged, disengaged, or the spindles stopped altogether, by one stroke of a lever.

The rails and tables are made in four lengths, ranging from 5' to 11', and the part of the housings upon which the table rests is made in three heights as indicated below. Besides the support given them by the rail and table the housings are tied together by a brace in the rear.

SPECIFICATIONS.

Diameter of spindles, least section.....	1 $\frac{1}{2}$ "
Spindles bored to fit Morse taper.....	No. 4
Vertical traverse of spindles.....	12"
Largest diameter of driving cone.....	18"
Width of belt for cone.....	4"
Size of tight and loose pulleys.....	18" x 5 $\frac{1}{4}$ "
Speed of countershaft, revolutions.....	500
Approximate weight, six head on 7' rail.....	7,225 lbs.

MULTI-SPINDLE MACHINE FOR DRILLING MUD RINGS FOR LOCOMOTIVES.

TYPE B.



FIG. 11320.

reaches lowest position, preventing damage to gears. Spindles are universally driven, but any can be disconnected by a clutch, operated by a handle placed in front of each head. Spindles are raised and lowered to or from the work collectively by a lever, feed changed and hand wheel and friction feed operated all at the end of the machine. Table is T slotted to hold the work. Capacity, twelve 1" holes in steel. Countershaft accompanies machine.

SPECIFICATIONS.

Minimum distance between spindles, 5"; maximum, 8". Maximum distance between outside spindles, 134". Traverse of spindles, 14". Diameter of spindles in bearings, 2 1/4". Distance from floor to top of table, 30". Maximum distance, spindles to table, 16". Total height, 112". Distance between housings, 144". Floor space, 212" x 60". Weight, 18,500 lbs.

DOUBLE MACHINE FOR BORING CONNECTING RODS.

DESCRIPTION FIG. 11321.

There are two complete and independently driven machines mounted on a heavy base and having lateral adjustment thereon. Capacity, 12" holes in each end of a rod, on from 3' to 10 1/2' centers. Heads adjustable. Spindles are counter-balanced and have extra weights for counterbalancing boring bars. Hand and power feed, improved quick return and stop motion, permitting spindles to be quick returned or approached while power feeding and point of boring tool to be brought to the work and power feed thrown in by same lever while machines are in operation. There are eight changes of speed and four changes of feed. Bases are bored for bushings to support boring bars. The sub-base has oil gutters around the edge and deep trough through the center. Machine is supplied with oil pump and the necessary piping to deliver a steady flow of oil to the center of each spindle. Two countershafts for driving the machines and one for driving the pump are included in the outfit.

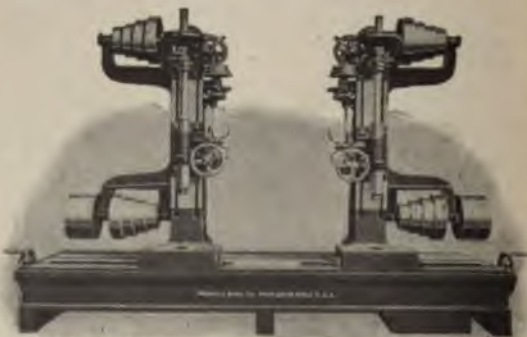


FIG. 11321.

SPECIFICATIONS.

Distance, spindle to bases, maximum, 33"; minimum, 5". Traverse of spindles, 13". Distances between centers, maximum, 126"; minimum, 32". Diameter of spindle in sleeve, 2 1/4". Nose of spindle, 3 1/4". Total ratio of driving gears, 1 to 20; back gears, 1 to 5. Cone belt, 3 1/2". Driving pulleys, 16" x 5". Speed of countershaft, 230 revolutions per minute. (Gives spindle revolutions, maximum, 100; minimum, 16.7.) Floor space, 13' x 4'. Height, 8' 9". Weight, 17,500 lbs.

PORTABLE DRILLS.

DESCRIPTION FIG. 11322.

NO. A.

The arm has a reach of 12', drilling, at one setting, anywhere over a surface of 24" outside diameter and 9" inside diameter.

The spindle is held in a vertical position by a squaring collar which is splined to the arm and bolted to the post; by loosening this collar it can be set at any angle.

NO. B.

The arm has a reach of 16½', drilling, at one setting, anywhere over a surface of 33" outside diameter and 11" inside diameter.

The spindle is held in a vertical position by a squaring collar which is splined to the arm and bolted to the post; by loosening this collar it can be set at any angle.

NO. 1.

The arm has a reach of 16½', drilling, at one setting, anywhere over a surface of 33" outside diameter and 11" inside diameter.

It is held in a vertical position by a squaring collar fitted to the under side of the ball on the frame; on removing this collar, the spindle (by means of the ball and socket joint) can be set at any angle up to 30°

NO. 2.

The arm has a reach of 21½', drilling, at one setting, anywhere over a surface of 43" outside diameter and 13" inside diameter.

It is held in a vertical position by a squaring collar fitted to the under side of the ball on the frame; on removing this collar, the spindle (by means of the ball and socket joint) can be set at any angle up to 30°

NO. 3.

The arm has a reach of 21½', drilling, at one setting, anywhere over a surface of 43" outside diameter and 13" inside diameter.

The spindle is held in a vertical position by a squaring collar fitted to the underside of the ball on the frame; on removing this collar, the spindle (by means of the ball and socket joint) can be set at any angle up to 30°

NO. 4.

The arm has a reach of 28', drilling, at one setting, anywhere over a surface of 50" outside diameter and 16" inside diameter.

NO. 5.

The arm has a reach of 36', drilling, at one setting, anywhere over a surface of 72" outside diameter and 22½" inside diameter and is adapted for the very heaviest drilling and boring, being powerfully back geared.



FIG. 11322.

SPECIFICATIONS.

SIZE.	No. A.	No. B.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Spindle, traverse of.....	3¼"	5"	5"	5"	7"	12"	20"
Spindle, diameter of.....	1½"	1½"	1½"	1½"	1½"	1½"	2½"
Spindle, bored to fit Morse taper.....	No. 2	No. 3	No. 3	No. 4	No. 4	No. 4	No. 5
Spindle, number of speeds.....	3	3	3	4	4	8	10
Spindle, speeds, revolution per minute.....	160 to 390	109 to 266	109 to 266	58 to 176	35 to 127	40 to 197	36 to 111
Spindle, feeds, per revolution.....					.005", .007", .013"	.005" to .075"	.005" to .075"
Vertical adjustment post.....	5"	3"	5"	6"	6"	6"	8"
Countershaft, revolutions per minute.....	250	300	300	200	200	200	150
Size pulleys.....	9"	10"	10"	10"	10"	10"	16"
Width, belt.....	2½"	3"	3"	3"	3"	3"	3½"
Size rope used.....	½"	¾"	¾"	¾"	¾"	¾"	¾"
Countershaft used.....	No. 1	No. 2	No. 2	No. 2	No. 2	No. 2	No. 3
Net weight of drill.....	75 lbs.	125 lbs.	140 lbs.	250 lbs.	285 lbs.	400 lbs.	900 lbs.

MOTOR DRIVEN PORTABLE DRILLS.



FIG. 11323.

DESCRIPTION FIG. 11323.

NO. 4.

This machine is our regular No. 4 portable drill, fitted with motor drive and is capable of very much heavier work than the same machine rope driven. The range of speed is greater than in the rope driven apparatus and the machine, taken as a whole, is an extremely serviceable and satisfactory tool.

Net weight of machine, 765 lbs.

NO. 5.

Our regular No. 5 drill equipped with motor drive comprises this machine, and, as is the case with the No. 4, the combination forms a tool with a much greater range and flexibility than is possible with the rope driven apparatus.

This drill is capable of performing almost any work that could possibly be required of it. For efficiency and rapidity of execution of heavy and awkward drilling and boring, it is unequalled.

Net weight of machine, 1,300 lbs.

ELECTRICALLY DRIVEN BREAST DRILL.

DESCRIPTION FIG. 11324.

For drilling the many small holes in large pieces, we have designed the small drill shown in cut. It will be found to be very effective for such work and a great time saver over the old hand drills. The drill is driven at much higher speed than is possible by hand. The operator can give his entire attention to guiding the drill and can keep at it, as his strength is not exhausted by turning the crank. It will save its cost in a short time and no shop can afford to be without one.



FIG. 11324.

SPECIFICATIONS.

	No. 1.	No. 2.
Will drill up to.....	$\frac{3}{8}$ "	$\frac{3}{4}$ "
Weight of machine.....	15½ lbs.	22½ lbs.
Weight of machine crated for domestic shipment.....	20 lbs.	27 lbs.
Weight of machine boxed for foreign shipment.....	22 lbs.	30 lbs.
Dimensions of box for foreign shipment.....	14" x 7" x 7"	18" x 8½" x 8½"
Maximum horse-power of motor.....	$\frac{1}{4}$	$\frac{1}{4}$

Wound for either 110 or 220 volts, direct current.

PORTABLE ELECTRIC DRILLS.

SPECIFICATIONS FIG. 11326.

Size.	Type	Volts	Capacity of Chuck.
3/4"	A	110	0" to 3/4"
1/2"	B	220	0" to 1/2"
3/8"	A	110	0" to 3/8"
1/4"	B	220	0" to 1/4"
1/2" change of speed..	A	110	0" to 3/4"
1/2" change of speed..	B	220	0" to 1/2"

Combined handle and breast plate furnished, instead of breast plate illustrated, when desired. In ordering, kindly state voltage, (this is very important), also size of machine desired.

Note: In addition to the sizes above listed, we can furnish a similar machine designed to drive 3/4" drills.



FIG. 11326.

DESCRIPTION FIG. 11326.

We here illustrate our type "KK" hand drill, fitted with a screw feed and spindle carrying a taper socket. This drill is practically the same as our type "K" but has a capacity up to 3/4". It is provided with two speeds.

The "Old Man" as illustrated is furnished as an extra, and is not included in the price of the drill.

Type.	Volts.	Dimensions Over All.	Weight.	Capacity
KK-110	110	5 1/2" x 20"	30 lbs.	0" to 3/4"
KK-220	220			

DESCRIPTION FIG. 11327

We here present a new type of a portable electrical radial drill, especially suitable for light work and which is built on new and original lines. It is really a portable universal radial drill and we claim that it will do about all the work of a stationary radial drill up to its capacity, and being portable can be taken to the work.



FIG. 11326.



FIG. 11327.

This drill is provided with a 10" feed through the hand wheel, with a quick return by hand. It has a radius of 24" in any direction at any angle. Hand wheel and worm box have a swivel adjustment from horizontal to vertical, permitting the use of the drill in corners and close places, according to where the work is to be done.

The spindle is fitted with a ball bearing thrust and carries a taper socket. This drill has two speeds, changeable by means of a thumb lever at lower end of motor. The vertical and horizontal columns are made of hollow steel tubing and are adjustable, enabling the operator to drill at any angle and in any direction.

This machine is self contained and portable in the full sense of the word and its usefulness will be readily recognized. Its range of work is unlimited, as it can be taken to any part of the shop or any distance on outside work. Any desired length cord can be used. This convenience saves time and trouble, and does away with carrying heavy work to the drill press. One man can easily handle it. No belt connections of any kind. Driving power from the ordinary incandescent lamp socket, direct current.

PORTABLE ELECTRIC DRILLS.



FIG. 11328.

DESCRIPTION FIG. 11327.—Continued.

Type.	Volts.	Height Over All as Illustrated.	Weight.	Capacity.
N-110.....	110	28"	115 lbs.	3/8"
N-220.....	220			
NN-110.....	110	34"	210 lbs.	1 1/4"
NN-220.....	220			

DESCRIPTION FIG. 11328.

This is, without doubt, one of the handiest little tools on the market. It is designed to take the place of the old style hand drill, and is driven at a much higher speed, without exhausting the strength of the operator.

It is under perfect control at all times, as the motor is provided with a switch to start and stop it. It is located near the vertical handle, as shown in illustration, and is easily reached by the index finger.

The chuck spindle is so arranged as to allow drilling on a line with the base of the motor, and by this means permitting angle and corner drilling.

The motor is enclosed, and suitably geared to develop the necessary power up to the capacity of the drill. Being light in weight, it can be carried anywhere, and the range of operation is not limited, as any length of cord can be used.

Sent out complete, ready for work, with chuck, cord and attachment plug. Any incandescent light socket furnishes the power.

Type.	Volts.	Dimensions Over All Including Chuck and Handle.	Weight.	Will Hold Drills from
G-110.....	110	4 1/4" x 13"	12 lbs.	0" to 1/4"
G-220.....	220			
H-110.....	110	4 1/4" x 15"	14 lbs.	0" to 3/8"
H-220.....	220			

FLEXIBLE SHAFTS.

DESCRIPTION FIGS. 11329 AND 11330.

The core is composed of segments made of gun metal, encased in square steel wire made and tempered especially for this specific purpose, that in turn is covered with leather or specially prepared rubber, warranted to withstand 350° of heat and to be unaffected by the soft grease used in lubricating the core.

It can be made to meet requirements not possible in other shafts, one of which is that it is capable of being run in both directions, delivering the maximum power, and in any length of section up to 8'; the parts being interchangeable, the sections can be coupled together, making a shaft of much greater length than can be procured any other way. It has been pronounced by expert mechanics the ideal flexible shaft, the segments being of such contour that they are neither affected by, nor do they affect the slight opening formed on the one side of the wire casing, in rounding a curve.

The shaft should be kept thoroughly lubricated, being greased not less than twice a day, where it is kept running steadily, the most convenient method of doing this being to remove the end fittings and withdraw the core into a trough and apply the soft grease by hand. The effect of this treatment will be to greatly increase the life of the shaft.

In case of accident, a broken segment can be readily replaced and repairs completed at the place the shaft is in use, doing away with the necessity of sending the shaft to the factory, an objectionable feature in shafts of other makes. The cost of such repairs is also reduced to a trifling figure, making the economy of their use the marked characteristic.

It makes practical what has heretofore been deemed impossible with a flexible shaft.

Back lashing has been eliminated.



FIG. 11329.

FLEXIBLE SHAFTS.

DESCRIPTION FIG. 11330.—Continued.

Fig. 11330 is a sectional view of the flexible shaft. AA, leather or rubber and wire case. B, Core. C, cord for tightening belt. D, driving belt.

In all correspondence, the term flexible shaft means the shaft only, as shown on the cut.

No.	3	4	44	5	6	8	9
Diameter of core.....	3/4"	5/8"	3/4"	3/4"	1"	1 1/4"	1 1/2"
Length of shaft.....	5'	6'	7'	7'	8'	8'	8'
Weight complete as per cut.....	10 lbs.	18 lbs.	25 lbs.	30 lbs.	35 lbs.	60 lbs.	80 lbs.

When a flexible shaft is desired of double or more the length of the standard, we would recommend the coupling of two or more shafts of standard length together rather than making them in one piece. They are fully as durable, and in case of accident are more cheaply and easily repaired.



FIG. 11330.

FLEXIBLE SHAFT DRILLING OUTFITS.

DESCRIPTION FIG. 11331

The cut represents full portable drill plant, consisting of flexible shaft, countershaft, drill press, roundabout, etc. The wheels and pulleys are of a size to permit the use of 3/4" rope, doing more work with less tension than a larger size rope, and saving the wear on the belt.

Each outfit is supplied with 100' of driving rope. This rope may be either of cotton or of rawhide, and purchaser should state in ordering which kind is wanted.

Speed of countershafts as given in table is approximate and should be varied to suit conditions.



FIG. 11331.

SPECIFICATIONS.

No.	Drills, Capacity, About.	Speed of Countershaft, About.	Shipping Weight, About.
3.....	3/4"	200	135 lbs.
4.....	1/2"	650	145 lbs.
4 1/2.....	3/4"	450	285 lbs.
5.....	1"	450	300 lbs.
6.....	1 1/2"	440	325 lbs.
8.....	2"	425	390 lbs.
9.....	2 1/2"	400	420 lbs.

PORTABLE SCREW FEED DRILL PRESS.

FOR USE WITH FLEXIBLE SHAFT.

DESCRIPTION FIG. 11332.

All sizes are of the same type as shown in the cut. Are carefully and accurately made, with heavy cast iron frame, steel spindles and feed screw, cut gears, hardened clutch, that they may be thrown in or out of gear at will. Are arranged to take Morse twist drills and fitted with Morse taper socket. Drill presses geared back 4 to 1.

Size Flexible Shaft.	Size Hole will Drill.	Size Taper Socket.	Flexible Shaft, Rev. P. M.	Maximum H. P. of Shaft at given Rev.
No. 3.....	3/8"	1/4" to 3/8"	1,050	1/4
No. 4.....	1/2"	1/2" to 1/2"	1,000	3/4
No. 4 1/2.....	3/4"	3/4" to 1 1/4"	950	3/4
No. 5.....	1"	1" to 1 1/4"	900	1 1/2
No. 6.....	1 1/2"	1 1/2" to 1 3/4"	800	2 1/2
No. 8.....	2"	1 3/4" to 2"	750	4
No. 9.....	2 1/2"	2" to 2"	600	6

All drill presses are fitted for drill rest and support.* For drill presses same numbers may be used as for flexible shaft.

Note: Where the developed power of the shaft will permit the use of a larger drill than the standard size socket will take, the drill shank must be turned down to fit.

* Drill rest and support is extra.



FIG. 11332.

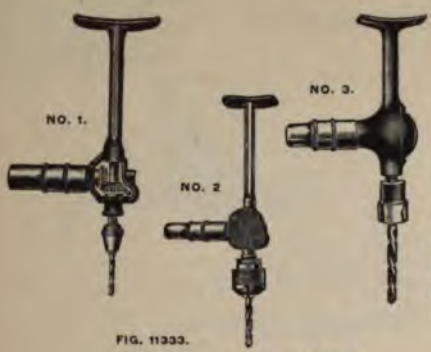


FIG. 11333.

BREAST DRILLS.

FOR USE WITH FLEXIBLE SHAFT.

DESCRIPTION FIG. 11333.

The cuts illustrate breast drills. All are furnished with gear covers. In No. 1 it is left off to show gearing. Nos. 1 and 2 are practically the same, except the chucks.

All the drills are of the best possible material. No. 1, with Trump chuck taking drills from 0" to 3/4". No. 2, Whiton chuck taking drills from 0" to 1/2". Each has clutch attachment to throw them in or out of gear at will. For heavy work No. 3 should be given the preference. The capacity of all breast drills is limited to the body pressure possible to put upon them.

COUNTERSHAFTS.

FOR USE WITH FLEXIBLE SHAFT OUTFITS.

DESCRIPTION FIG. 11334.

We make three sizes to be used in connection with the flexible shafts. They are carefully proportioned and well made.

No. 3 is used with all sizes of shafts up to and including No. 4; has a three step cone pulley, and tight and loose pulleys 5" in diameter, for 2 1/2" belt.

No. 6 is used with Nos. 4, 4 1/2, 5, 6, and 8 shafts; has three step cone pulley, tight and loose pulleys 10" in diameter for 3 1/2" belt.

No. 9 is used with No. 9 shaft; has three step cone pulley and tight and loose pulleys 12" in diameter for 4" belt.

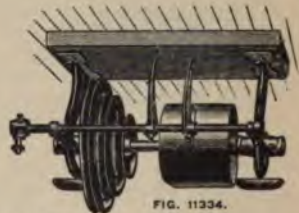


FIG. 11334.

TAPPING AND REAMING MACHINE.

FOR USE WITH FLEXIBLE SHAFT.

DESCRIPTION FIG. 11335.

These machines are designed for tapping and reaming staybolt holes in boilers, and reaming in bridge work. No. 1 is preferable for light work on account of its weight, but for heavier work we recommend No. 2 as having increased diameter and face of gears. It is both a powerful and durable machine. No. 2 has a square hole in both ends of the tapping spindle, so that by turning machine over and attaching to tap, it will back it out without stopping or reversing motion of shaft.

Also pitch of teeth. The bearings are also longer and larger.

All tapping and reaming machines are fitted to Nos. 8 and 9 shafts unless otherwise ordered, and are interchangeable with drill presses of same number of shaft.

No. 1. Weight, 15 lbs. Geared 5 1/2 to 1, has 3/4" square hole in one end of spindle.

No. 2. Weight, 20 lbs. Geared 5 1/2 to 1, has 5/8" square hole in both ends of spindle.

We can furnish No. 1 with holes in both ends of spindle when desired.



FIG. 11335.

PORTABLE FLEXIBLE SHAFT ELECTRIC PLANTS.

FOR DRILLING, TAPPING AND REAMING.

DESCRIPTION FIG. 11336.

With a power that can be handled so economically and quickly as electricity, the advantage of the motor driven portable drilling plant becomes strongly manifest. These conditions create a demand for such tools that we can efficiently and satisfactorily fulfill. The cut illustrates one of our tools at work in a large factory. It consists of motor, speed regulator, starting and stopping device, reduction gears, truck, and the regular drilling attachments. Connect the wires and the plant is ready for work. Motors are wound for 110, 220, 500 volts direct current, but can be furnished to order for any practical voltage. Also alternating current motors.

The motors are semi-enclosed, allowing ready inspection without removal of cover plates. Will carry overload of 50 per cent. without sparking.

Specifications on following page.



FIG. 11336.

PORTABLE FLEXIBLE SHAFT ELECTRIC PLANTS.

DESCRIPTION FIG. 11336.—Continued.

NO. 4 PLANT.

Drilling up to $3\frac{1}{2}$ ".

Consists of

- 1 one horse-power motor, complete.
- 1 No. 4 flexible shaft, less pulley head.
- 1 No. 4 universal joint.
- 1 No. 4 drill press.
- 1 No. 4 drill rest and support.

The maximum speed of this motor is 1,100 revolutions per minute. Speed regulator will give 50 per cent. reduction. Drill press geared 4 to 1. Flexible shaft driven direct from armature shaft. When breast drill is desired in place of drill press deduct \$20.00 from the above list. This includes the difference in price between the drills and also the cost of the drill rest, which is not required with the breast drill.

NO. 8 PLANT.

Drilling up to $13\frac{1}{4}$ ".

Consists of

- 1 two horse-power motor, complete.
- 1 No. 8 flexible shaft, less pulley head.
- 1 No. 8 universal joint.
- 1 No. 8 drill press.
- 1 No. 2 tapping and reaming machine.
- 1 No. 8 drill rest and support.

NO. 6 PLANT.

Drilling up to $1\frac{1}{4}$ ".

Consists of

- 1 one and a half horse-power motor, complete.
- 1 No. 6 flexible shaft, less pulley head.
- 1 No. 6 universal joint.
- 1 No. 6 drill press.
- 1 No. 6 drill rest and support.

Note: The maximum speed of this motor is 1,800 revolutions per minute. The reduction gears are made to bring this speed into proper relation to drill press. Drill press geared 4 to 1. Speed regulator will give 50 per cent reduction from maximum.

NO. 9 PLANT.

Drilling up to $23\frac{1}{4}$ ".

Consists of

- 1 two and a half horse-power motor, complete.
- 1 No. 9 flexible shaft, less pulley head.
- 1 No. 9 universal joint.
- 1 No. 9 drill press.
- 1 No. 2 tapping and reaming machine.
- 1 No. 9 drill rest and support.

DRILL PRESS VISE.

SPECIFICATIONS FIG. 11337.

Size No.	Width Jaw.	Depth Jaw.	Jaws Open.	Approximate Shipping Weight.
4 $\frac{1}{2}$	4 $\frac{1}{2}$ "	2"	5"	35 lbs.
5 $\frac{1}{2}$	5 $\frac{1}{2}$ "	2"	6"	45 lbs.



FIG. 11337.

IDEAL REVERSING TAP HOLDER.

DESCRIPTION FIG. 11338.



FIG. 11338.

No special taps are required. Operated with one hand, same as a drill chuck. Indispensable for handling large quantities of particular work.

Tappers Nos. 1 and 2 are especially valuable tools to use in multiple or turret drills, when a piece of work is to be drilled and tapped with one handling. Blank shanks furnished with each size.

These holders have been installed in the works of the largest manufacturers in the country, and give excellent results. The No. 1 is particularly adapted for use on bicycle, typewriter, cash register parts, etc., while for heavier work, the larger sizes are unequaled by any reversing tap holder on the market.

No. 1, taps up to $\frac{3}{8}$ ".

No. 2, taps up to $\frac{1}{2}$ ".

No. 3, taps up to $1\frac{1}{4}$ ".

These tap holders are furnished with shanks to fit any drill press. They can be supplied with chuck or with stem and bushing, as desired.

REVERSING TAPPING CHUCK.

DESCRIPTION FIG. 11339.

This half tone illustrates our reversing tapping chuck for use in drill press or lathe. We believe that in this device we have the simplest and strongest tool possible for the purpose. The operation is very simple. Feed the drill press down in the ordinary manner until the desired depth is reached. The chuck is reversed by returning the drill press spindle.

Or the chuck may be thrown out of gear when the tap reaches the required depth by setting the stop collar on drill spindle one quarter of an inch higher than depth of hole when tap is resting on surface of work.

This tool is the best money maker that can be put into a shop for the price. To illustrate: it will take a man fifteen minutes to tap two holes in the ordinary manner; the same man can tap them in less than five minutes perfectly true with this tool. Where there is more tapping it will show a greater saving. A pretty good interest on the investment during the year.

On heavy work a drill may be put in chuck and the hole drilled and tapped without moving.

The price includes any size Morse taper mandrel and Horton tap holding chuck, fitted, ready to use.



FIG. 11339.

CAPACITY.

- No. 1. 0" to 3/8".
- No. 2. 0" to 1/2".
- No. 3. 0" to 5/8".
- No. 4. 0" to 3/4".

AUTO-REVERSE TAPPING CHUCK.

WITH ADJUSTABLE POSITIVE STOP.

DESCRIPTION FIG. 11340.

The style B stop holds the work down while the clutches disengage.

Where the work is easily handled and centered, so that all the holes can first be drilled, and then the work rehandled and tapped, this simplest form of the tapping chuck is recommended.

Only one hand is required to operate the chuck, leaving the other free to handle duplicate parts in bulk, by passing them between two parallel pieces, or other suitable fixture clamped on drill table that avoids holding each piece. Astonishing results are thus being secured by its users, some tapping as high as 15,000 to 20,000 holes a day by this method.

Radial drill work.
Tapping in surfaces at different heights.
No stop required on machine.
Quick and exact adjustment.

- No. 00 taps to 3/8".
- No. 0 taps to 1/2".
- No. 1 taps to 5/8".
- No. 2 taps to 1".
- No. 3 taps to 1 1/4".
- No. 4 taps to 1 1/2".

STYLE B.

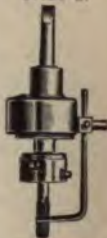


FIG. 11340.

AUTO-REVERSE TAPPING CHUCK.

WITH ADJUSTABLE FRICTION TOOL HOLDER.

STYLE C.

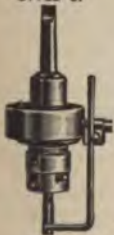


FIG. 11341.

Tapping steel, bronze, etc., as safely as

cast iron.

Bottom tapping.

Impossible to break taps.

"Fool proof."

- No. 00 taps to 3/8".
- No. 0 taps to 1/2".
- No. 1 taps to 5/8".
- No. 2 taps to 1".
- No. 3 taps to 1 1/4".
- No. 4 taps to 1 1/2".
- No. 5 taps to 2".

DESCRIPTION FIG. 11341.

The novel combination of a slip spindle with an adjustable friction secures in this device a wonderfully sensitive tool for quick, accurate tapping in steel, bronze, copper, etc., wherever there is danger of breaking taps. Should the tap stick in the work the friction slips (to avoid breakage), whereupon the tap can be reversed, oiled, and started ahead again, and so on until the toughest piece of metal can be smoothly tapped with absolute safety.

This device can be used with or without a stop collar on machine spindle (or table), although it is quicker and easier to disengage the auto-reverse clutches by using a stop collar (or stop by hand), to avoid unclutching under pressure should the tap first strike the bottom of the hole before the clutches automatically disengage.

The friction drive can at any time be changed to positive drive by slipping a key into the spindle through slot under the lug of the fiber check washer.



FIG. 11342.

Patented Sept. 16, 1902.



THE JACOBS IMPROVED DRILL CHUCK.

SPECIFICATIONS FIGS. 11342 AND 11343.

No.	Capacity.
1.....	0 to $\frac{1}{2}$ "
2.....	0 to $\frac{3}{4}$ "
3.....	0 to $\frac{1}{2}$ "



FIG. 11343.

NEW MODEL DRILL CHUCK.

SPECIFICATIONS FIG. 11344.

No.	Capacity.
11.....	0 to $\frac{1}{2}$ "
12.....	0 to $\frac{3}{4}$ "
13.....	0 to $\frac{1}{2}$ "



FIG. 11344.

STANDARD DRILL CHUCK.

SPECIFICATIONS FIG. 11345.

No.	Capacity.	Diameter.	Length.
000.....	0" to $\frac{1}{4}$ "	$1\frac{1}{2}$ "	$2\frac{1}{2}$ "
00.....	0" to $\frac{3}{8}$ "	$1\frac{3}{8}$ "	$2\frac{1}{2}$ "
100.....	0" to $\frac{1}{2}$ "	$2\frac{1}{8}$ "	$2\frac{3}{8}$ "
101.....	0" to $\frac{3}{4}$ "	$2\frac{3}{8}$ "	$3\frac{1}{8}$ "
102.....	0" to 1"	$3\frac{1}{8}$ "	$4\frac{1}{4}$ "
103.....	0" to $1\frac{1}{2}$ "	5"	.....
104.....	0" to 2"	6"	.....



FIG. 11345.

IMPROVED POSITIVE DRIVING DRILL CHUCK.

DESCRIPTION FIG. 11346.

The distinctive feature of this chuck is the patented equalizing driver in which the end of the drill is inserted, giving positive rotation to the drill independently of the jaws of the chuck. This driver is self-adjusting, permitting the jaws to center and align the drill accurately in the chuck, so that it is always true and absolutely impossible for the drill to slip while in work.

SPECIFICATIONS.

No.	Diameter.	Capacity.	Weight of Chucks.
1.....	$2\frac{1}{4}$ "	0" to $\frac{1}{2}$ "	$2\frac{1}{2}$ lbs.
2.....	3"	0" to $\frac{3}{4}$ "	$5\frac{1}{2}$ lbs.
3.....	$3\frac{1}{2}$ "	0" to 1"	10 lbs.
4.....	$5\frac{1}{4}$ "	0" to $1\frac{1}{2}$ "	$23\frac{1}{2}$ lbs.
5.....	$6\frac{1}{4}$ "	0" to 2"	48 lbs.



FIG. 11346.



FIG. 11347.

LITTLE GIANT IMPROVED DRILL CHUCK.



FIG. 11348.

DESCRIPTION FIGS. 11347 TO 11349.

Fig. 11347 shows regular pattern chucks, No. 00 to No. 215.
Fig. 11348 shows regular pattern chucks Nos. 3 and 4.
Fig. 11349 shows same style chuck made with straight body.

SPECIFICATIONS.

No.	Approximate Diameter.	Handle Drills.
00	1 1/8"	0" to 1/2"
0	2 1/2"	0" to 1/2"
1	3"	0" to 3/4"
2	3 1/2"	0" to 1"
2 1/2	4"	0" to 1", extra strong
3	6"	0" to 1 1/2"
4	6 1/2"	0" to 2"



FIG. 11349.

BENCH MACHINE.



FIG. 11350.

NO. 2 TAPPING MACHINE.

DESCRIPTION FIG. 11350.

This machine is built to mount on bench, as shown, or can be furnished with iron column, if desired.

A suitable tap holder, fitted to the spindle, can be supplied at extra cost.

SPECIFICATIONS.

Weight of machine without column.....	25 lbs.
Weight with column.....	85 lbs.
Pulleys, tight and loose.....	6" x 1 1/2"
Capacity.....	3/8"

NOS. 0 AND 1 VERTICAL TAPPING MACHINES.

DESCRIPTION FIG. 11351.

The spindle is driven directly by a continuous belt and a friction disk between two pulleys, which connects the spindle with either at will. The disk has but a small vertical motion, insuring the quick reversing of the tap, small wear and no noise.

The table is counterbalanced by a weight and provided with a knee lift, allowing the full use of both hands for holding the work. An adjustable screw stop limits the motion of the table in either direction and insures a uniform depth of tapping. The machine can be arranged to do left-hand tapping by changing the position of one of the idler pulleys at the back.

We arrange them for mounting on a bench when so desired. (The table on the No. 0 size is operated by treads instead of the knee lift.)

Equipment.—No. 0 vertical tapper: chuck and wrench; 1 plain counter.

No. 1 vertical tapper: chuck and wrench; 1 plain counter.

SPECIFICATIONS.

	No. 0.	No. 1.
Largest tap machine will drive.....	3/8"	1/2"
Depth that can be tapped.....	1 1/2"	2"
Greatest distance between chuck and table.....	3"	6"
Dimensions of table.....	8 1/2" x 5 1/4"	10" x 12"
Width of spindle belt.....	1"	1 1/2"
Tight and loose pulleys on countershaft.....	4 1/2" x 2"	6" x 2"
Speed of countershaft, revolutions per minute.....	220	200
Floor space required.....	18" x 12"	21" x 14"
Net weight, complete.....	145 lbs.	230 lbs.
Foreign shipment, tight boxed, size.....	8 cubic feet	10 cubic feet
Foreign shipment, tight boxed, weight.....	200 lbs.	300 lbs.

NO. 1 MACHINE.



FIG. 11351.

NO. 1 BENCH TAPPING MACHINE.

DESCRIPTION FIG. 11352.

No. 1 bench tapping machine has a range to $\frac{1}{4}$ ", it being fitted with drill chuck to hold taps to that size.

Height of machine, 15".

Size of base, 13" x 16".

Diameter of swing table, 11 $\frac{1}{2}$ ".

Clearance of tap spindle to column, 6".

Vertical adjustment of table, 3".

Base has a planed surface, which gives greater range for jig work.

Speed of countershaft, 450 revolutions.

Weight, 135 lbs.

This machine is mounted on column 33" high, when desired.



FIG. 11352.

NO. 2 BENCH TAPPING MACHINE.

DESCRIPTION FIG. 11353.

This machine has the same general dimensions as the No. 1 machine, shown in Fig. 11352.

In addition it has an adjustable belt tightening bracket on back of machine as shown in cut. These machines are equally satisfactory on either blind or through holes and tap to the required depth every time, which gives uniform work and prevents the breaking of taps.

Weight, 150 lbs.



FIG. 11353.

NO. 1 HORIZONTAL TAPPING MACHINE.

DESCRIPTION FIG. 11354.

This machine is designed for tapping small holes ranging from $\frac{1}{16}$ " to $\frac{1}{8}$ " in diameter, and is similar in general design to the No. 2 machines.

The head stock is solid with the bed, and the driving pulleys run on hollow studs, which relieve the spindle of all wear and pressure due to the belt and make the spindle sensitive to the tap.

The spindle is fitted with an Almond chuck to hold taps and is driven by a friction clutch working between the two pulleys, which are driven by open and cross belts, insuring instantaneous reversing of the tap.

The tail spindle has a movement of 11 $\frac{1}{2}$ " by lever, and is provided with a binder and an adjustable stop collar.

The work pad is removable and a taper hole is fitted in the tail spindle to receive tools for drilling purposes.

An oil reservoir is formed in the bed and a large pan is provided to hold the work.

Equipment: Two wrenches; 1 chuck; 1 plain countershaft.

SPECIFICATIONS.

Greatest distance between chuck and work plate.....	7 $\frac{1}{2}$ "
Swing over bed.....	6 $\frac{1}{2}$ "
Width of spindle bell.....	1 $\frac{1}{2}$ "
Tight and loose pulleys on countershaft.....	6" x 2 $\frac{1}{2}$ "
Speed of countershaft, revolutions per minute.....	225
Floor space required.....	30" x 19"
Domestic shipment, crated, weight.....	300 lbs.
Foreign shipment, tight boxed (S. C. L.), weight.....	450 lbs.



FIG. 11354.



FIG. 11355.

NO. 2 HORIZONTAL TAPPING MACHINE.

DESCRIPTION FIG. 11355.

This machine is an efficient tool of thoroughly approved design and is suitable for tapping holes from $\frac{3}{8}$ " to $\frac{1}{2}$ " diameter.

The head stock is solid with the bed and fitted with cap bearings in which run the hubs of the driving pulleys, so that the spindle is freed from the wear and pressure of the belt.

The spindle is driven by a positive clutch working between the two pulleys, and is fitted with an adjustable collar to provide for tapping very shallow holes and a universal three jaw chuck for holding taps.

The tail spindle has a movement of 2" by lever and is provided with a binder and an adjustable stop collar.

The work pad is removable, and the spindle is fitted with a taper hole to receive tools, so that the machine may be used for drilling purposes.

An oil reservoir is formed in the bed and a large pan is provided to hold the work.

We can also furnish with this machine a special tail block, arranged with hollow spindle and spring chuck, designed for threading rods or special work that can be held by the chuck. This fixture has a capacity for $\frac{3}{8}$ " to $\frac{1}{2}$ " stock.

Equipment: 2 wrenches, 1 chuck, 1 plain countershaft.

Greatest distance between chuck and work plate.....	12 $\frac{1}{2}$ "
Swing over bed.....	11"
Width of spindle belt.....	2 $\frac{1}{2}$ "
Tight and loose pulleys on countershaft.....	10" x 3"
Speed of countershaft, revolutions per minute.....	150
Floor space required.....	24" x 48"
Domestic shipment, crated, weight.....	400 lbs.

NO. 3 HORIZONTAL TAPPING MACHINE.

DESCRIPTION FIG. 11356.

This machine operates on the same general plan as the small horizontal tappers, but is geared up sufficiently to tap $\frac{3}{4}$ " holes. The work is held on the front or top surface of the slide, as most convenient, and pressed to the tap by the pilot wheel. When the adjustable stop on the slide strikes the tail block, the action of the tap draws the driving clutch out of gear, and a slight backward movement of the pilot wheel throws in the fast running reversing clutch. The tap chuck is a self-centering, two-jawed one of special construction which grips the round shank and drives by the square end of the tap. The body of the chuck makes a universal joint with the end of the spindle to accommodate work out of center or taps not running true.

The tail block is adjustable along the bed and bound by the hand wheel. Chips and oil fall through the open bed to the large pan, and the oil drains into a reservoir, whence it is drawn off to supply an oil pot swung from the head stock.

Equipment: 2 wrenches, 1 chuck, 1 oil pot and bracket, 1 plain counter.

Greatest distance between chuck and work plate.....	9"
Swing over bed.....	11 $\frac{1}{4}$ "
Width of spindle belt.....	2 $\frac{1}{2}$ "
Tight and loose pulleys.....	8" x 3"
Speed of countershaft, revolutions per minute.....	350
Floor space required.....	41" x 22"
Domestic shipment, crated, weight.....	700 lbs.



FIG. 11356.

NO. 1 AUTOMATIC TAPPING MACHINE.

DESCRIPTION FIG. 11357.

In designing this machine we have sought to combine lightness, strength, ease and rapidity of manipulation, together with accuracy and uniformity of the work produced.

The spindle is fitted with two friction pulleys, driven in opposite directions by one continuous belt, and between these pulleys plays a friction clutch keyed to the spindle. The friction clutch is connected with the lever at the right by a toggle arrangement which is adjustable for any tension desired, so that any extra safety device to prevent breaking of taps is unnecessary. The tap is started by the lever at the right, and is tripped and reversed automatically at any point by an adjustable screw stop on the upper end of the spindle striking the reversing lever on the top of the machine, or by moving this lever by hand. The spindle is balanced and fitted with a chuck for holding taps. The table is rectangular with 2 T slots, and has an oil groove around it, and is adjustable up and down on the column to suit the work.

A valuable feature of this tool is that it operates satisfactorily at high speeds, and will trip or reverse after being set, though the operator should continue to press down the starting lever.

Motor drive. The application of motor drive to this machine is made in a very neat and simple manner. A $\frac{1}{2}$ horse-power constant speed motor at the foot of the column is geared down by a single pair of gears, and drives the machine by one continuous belt, the idler pulleys at the back serving also as tighteners. A bronze pinion is used, and the gearing runs very smoothly without noise and is protected by cover.

Equipment: chuck and wrench, plain countershaft.

Diameter of spindle.....	1"
Movement of spindle.....	2 $\frac{1}{2}$ "
Dimensions of table.....	11" x 18"
Vertical adjustment of table.....	20"
Width of spindle belt.....	1 $\frac{1}{2}$ "
Tight and loose pulleys on countershaft.....	6" x 2 $\frac{1}{2}$ "
Speed of countershaft, revolutions per minute.....	200
Floor space required.....	30" x 21"
Domestic shipment, crated, weight.....	430 lbs.



FIG. 11357.

NO. 4 VERTICAL TAPPING MACHINE.

DESCRIPTION FIG. 11358.

The machine is so constructed that the operator has every facility to handle work rapidly. As the work is brought up to the tap by the foot treadle he has both hands free to handle and hold the work firmly, and does not have to waste the time necessary to reach up to a handle at every operation.

As the platen stem works in a long sleeve, the work comes up to the tap true, insuring straight holes and avoiding breakage of taps.

Operator may tap the depth by the eye, or may set stop collar on platen stem.

Cone pulleys are turned inside and out; all bright parts are polished; all painted parts filled, rubbed to a flat surface and painted with egg shell gloss.

A suitable tap holder can be furnished, fitted to the machine, if desired.

SPECIFICATIONS FIG. 11358.

Height.....	60"
Height to platen.....	44"
Distance from platen to spindle.....	10"
Distance from column to center of spindle.....	5½"
Size of tight and loose pulleys.....	4" x 1½"
Both cone pulleys.....	6" and 4½" x 1½"
Speed recommended by tap manufacturers (many run them faster).....	300 to 600
Capacity.....	½"
Weight.....	120 lbs.



FIG. 11358.

NO. 6 VERTICAL TAPPING MACHINE.

DESCRIPTION FIG. 11359.

The machine is so constructed that the operator has every facility to handle work rapidly. As the work is brought up to the tap by the foot treadle he has both hands free to handle and hold the work firmly and does not have to waste time necessary to reach up to a handle at every operation.

As the platen stem works in a long sleeve the work comes up to the tap true, insuring true holes and avoiding breakage of taps.

As will be seen from the illustration the platen is operated by a gear engaging in a rack cut in the platen stem, which is counterbalanced by weight shown, so that the platen can be raised with one finger on handle, whether platen be empty or carrying 50 lbs.

Cone pulleys are turned inside and out; all bright parts are polished; all painted parts filled, rubbed to a flat surface and painted with egg shell gloss.

SPECIFICATIONS.

Height over all.....	62"
Height to platen.....	34"
Diameter of platen.....	15½"
Distance from column to center of spindle.....	8½"
Diameter of tight and loose pulleys.....	9"
Width of belt.....	2½"
Speed, revolutions per minute.....	325
Diameter cone steps.....	9", 7" and 5"
Width of belt.....	2"
Capacity.....	¾"
Weight.....	375 lbs.

FIG. 11359.



NO. 2 AUTOMATIC TAPPING MACHINE.

DESCRIPTION FIG. 11360.

In constructing this machine, gearing has been discarded and the spindle driven through friction clutches controlled by toggle connection, affording ample power and easy release in the most simple manner. The toggle connection can be adjusted to suit the stress on the tap, avoiding the breaking of taps and rendering the use of any safety device unnecessary.

The driving and reversing are provided by an endless belt which secures capacity for high speed without noise or jar. The spindle is pulled down by lever and the clutch automatically thrown in, and a trip with screw adjustment provided on the upper end of the spindle regulates depth of tapping. The spindle is counterbalanced, making it very sensitive in starting taps. The table is adjustable in all directions. These machines are specially adapted for manufacturing, as a large number of holes in a piece can be tapped with great rapidity and uniformity.

These machines are also made duplex, two independent heads being mounted on one column with one large table and spindles operated by hand or foot.

Motor drive: In the drive of this machine a variable speed motor having a variation of two to one is employed. The motor on the base plate is geared to a shaft carrying a single pulley, which drives the spindle by one continuous belt, and the rocking idlers at the top in the rear of the spindle serve as tighteners. No clutches, change gearing or cone pulleys are needed.

Changes of speed for different size taps are obtained from the motor. The pinion on the motor is bronze, and runs without jar or noise, and the gearing is protected by cover.

Equipment: 3 wrenches, 1 chuck, 1 plain countershaft, 1 table elevating bar.



FIG. 11360.

SPECIFICATIONS.

Diameter of spindle.....	1 1/2"
Movement of spindle.....	3"
Diameter of table inside oil channel.....	21"
Vertical adjustment of table.....	20"
Width of spindle belt.....	2 1/4"
Tight and loose pulleys on countershaft.....	10" x 3 1/2"
Speed of countershaft, revolutions per minute.....	155
Floor space required.....	45" x 31"
Domestic shipment, crated, weight.....	920 lbs.
Foreign shipment, tight boxed (45 cubic feet), weight.....	1,220 lbs.

BENCH MILLING MACHINES.

NO. 1 MACHINE. DESCRIPTION FIGS. 11361 AND 11362.

The No. 2 miller is similar to the No. 4, but has no overhanging arm.

The No. 3 miller is similar to the No. 1, but is provided with overhanging arm.

Attachments for these machines are described on following page.



FIG. 11361.



FIG. 11362.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.	No. 4.
Longitudinal feed of table.....	6"	8 1/4"	6"	8 1/4"
Traverse feed.....	2 1/4"	3 1/4"	2 1/4"	3 1/4"
Vertical motion to knee.....	2 1/2"	6"	8 1/2"	8 1/2"
Maximum distance between center of spindle and table.....	7"	7 1/4"	7"	7 1/4"
Working surface of table.....	3 1/2" x 12"	3 1/2" x 16"	3 1/2" x 12"	3 1/2" x 16"
Greatest distance between centers (6° swing).....	6 1/2"	9"	5 1/2"	9"
Largest diameter of cone.....	6"	6"	6"	6"
Smallest diameter of cone.....	3 1/2"	3 1/2"	3 1/2"	3 1/2"
Driving belt.....	7"	7"	7"	7"
Taper hole in spindle, B. & S.....	No. 8	No. 8	No. 8	No. 8
Hole in spindle.....	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Height over all.....	22"	22"	22"	22"
Loose pulley on countershaft.....	7" x 2 1/4"	7" x 2 1/4"	7" x 2 1/4"	7" x 2 1/4"
Speed of countershaft, revolutions per minute.....	280	280	280	280
Weight complete.....	220 lbs.	230 lbs.	250 lbs.	265 lbs.

MILLING MACHINE COLUMN.



FIG. 11363.

DESCRIPTION FIG. 11363.

This column is designed for use with bench milling machines shown in Figs. 11361 and 11362. It is 28 $\frac{1}{2}$ " high, measures 12 $\frac{1}{2}$ " x 16" at the base, 10" x 13 $\frac{1}{2}$ " at the top and weighs 72 lbs.

DESCRIPTION FIG. 11364.

This vertical milling attachment is especially adapted for use on our No. 3 and 4 milling machines (see Fig. 11362), and the spindle is so constructed as to use spring collets. One collet either 1 $\frac{1}{8}$ ", 3 $\frac{1}{8}$ " or 1 $\frac{1}{2}$ " is furnished with the attachment. Extra collets, with either straight or standard taper holes, furnished as desired. The gearing in this attachment is two to one, so that the spindle runs at twice the speed of the milling machine spindle, giving a speed of from 200 to 1,500 revolutions per minute.

VERTICAL MILLING ATTACHMENT.



FIG. 11364.

MILLING MACHINE VISE.



FIG. 11365.

DESCRIPTION FIG. 11365.

This vise is designed primarily for use with milling machines shown in Figs. 11361 and 11362, but can be used on other machines as well.

SPECIFICATIONS.

Vise jaws measure	3 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ "
Vise jaws open	2"
Weight of vise	11 lbs.

MILLING MACHINE INDEX CENTERS.

DESCRIPTION FIG. 11366.

These index centers are especially designed for the rapid production and indexing of light work of any kind. They are strongly built, the best of workmanship and materials only being used in their construction. One dial with forty-eight divisions is furnished with the centers. Blank dials or dials milled with other divisions furnished on application. The spindle is reamed for B. & S. taper No. 7, and is also threaded so that a face plate or chuck can be used.

Weight, 20 lbs. 6" swing.



FIG. 11366.

NO. 3¹/₂ AND NO. 5 BENCH MILLING MACHINES.



FIG. 11367.

SPECIFICATIONS FIG. 11367.

Dimensions of table.....	No. 3 ¹ / ₂ 10 ¹ / ₂ " x 3 ¹ / ₂ "	No. 5 12" x 3 ¹ / ₂ "
Longitudinal feed of table.....	4"	5 ¹ / ₂ "
Cross feed in line with spindle.....	2 ¹ / ₂ "	5"
Vertical range of knee.....	4"	5"
Diameter of largest step on head cone.....	5"	6"
Width of driving belt.....	1 ¹ / ₂ "	1 ¹ / ₂ "
Front bearing, cone form, length.....	1 ³ / ₄ " x 2 ¹ / ₄ "	1 ³ / ₄ " x 2 ¹ / ₄ "
Rear bearing, cone form, length.....	1 ³ / ₄ " x 1 ³ / ₄ "	1 ³ / ₄ " x 2"
Maximum capacity of split collets, clear through.....	1 ¹ / ₂ "	1 ¹ / ₂ "
Maximum capacity of split collets, part way through.....	1 ¹ / ₂ "	1 ¹ / ₂ "
Taper hole in spindle.....	No. 2 Morse or No. 7 B. & S.	No. 3 Morse or No. 7 B. & S.
Vise jaws.....	3 ¹ / ₄ " x 1 ¹ / ₄ "	3 ¹ / ₄ " x 1 ¹ / ₄ "
Jaws will open.....	1 ¹ / ₂ "	1 ¹ / ₂ "
Total height.....	16"	17 ¹ / ₂ "
Weight, with vise and countershaft.....	130 lbs.	160 lbs.

THE RIVETT BENCH MILLING MACHINE.

DESCRIPTION FIG. 11368.

Although this machine is small, it is very rigid, as the stock is disposed so as to give strength where it is especially needed, and it will do work more rapidly and smoother than a great many milling machines four times its size.

The work table is adjustable from two points; by the lever shown in the cut, and by a hand wheel at the back of the machine which is graduated to read in thousandths of an inch. The screw is entirely under cover and protected from the dirt and chips. It has also a rigid stop.

The machine is well adapted for steam gauge makers, small gears, cutters, saws, and all straight milling, also for the various parts of clocks, and other mechanical motions.

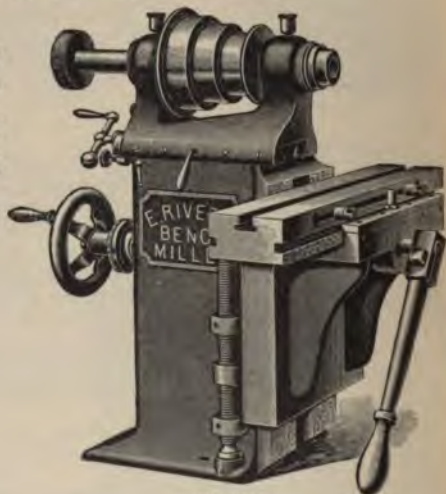


FIG. 11368.

WISE FOR RIVETT BENCH MILLER.



FIG. 11369.

CENTERS FOR RIVETT BENCH MILLER.



FIG. 11370.

DIMENSIONS.

Distance between centers.....	7"
Vertical movement.....	6"
Swing.....	6"
Vise.....	3 ¹ / ₄ " x 3 ¹ / ₄ "

NO. 1 HAND MILLING MACHINE.

DESCRIPTION FIG. 11371.

The table has an oil channel all around and is fed by rack and pinion, operated by lever in front, giving a direct motion and quick return.

The in and out and vertical adjustments have micrometer readings.

Adjustable stops are provided on the table to limit the length of cut.

A sliding head can be furnished, arranged for cutting gears on centers or with spring collets.

Equipment (with arm): 1 No. 2 plain vise and crank wrench; 1 vise holding-down screw and nut; 1 arbor plunger; 1 knee crank; 3 wrenches; 1 plain countershaft. (Without arm): 1 plain vise and crank; 1 arbor plunger; 1 knee crank; 2 wrenches; 1 plain countershaft.

Dimensions of table inside oil pockets.....	4" x 21 1/4"
Vertical adjustment under spindle.....	12 3/4"
Swing under arm.....	8"
Distance from spindle to outboard bearing.....	10"
Adjustment in line with spindle.....	4"
Taper hole in spindle.....	No. 7 B. & S.
Length of feed.....	12 3/4"
Largest diameter of cone.....	6 1/2"
Number of steps on cone.....	3
Width of belt required.....	2"
Tight and loose pulleys on countershaft.....	8" x 2 1/4"
Speed of countershaft, revolutions per minute.....	165
Domestic shipment, crated, weight.....	825 lbs.



FIG. 11371.

NO. 2. HAND MILLING MACHINE.

DESCRIPTION FIG. 11372.

The spindle has a taper bearing, running in a bronze box of our standard form, and the overhanging arm is also of standard design.

The table is fed by rack and pinion, with long, adjustable lever, and is provided with adjustable stops both ways.

The saddle has screw adjustment in line with the spindle.

The knee is moved by a long, adjustable lever through rack and pinion, and is nicely balanced in all positions, which gives an easy, sensitive motion and facilitates working. Adjustable screw stops in both directions are provided for the knee. A special quick acting vise for screw-slotting can be furnished with this machine.

Equipment No. 2: 1 plain vise and crank; 1 vise holding-down screw; 1 arbor plunger; 2 wrenches; 1 knee crank; 1 plain countershaft.

Dimensions of table.....	4 1/2" x 16 1/4"
Vertical adjustment under spindle.....	5 1/2"
Adjustment in line with spindle.....	3 1/2"
Taper hole in spindle.....	No. 7 B. & S.
Length of feed.....	6 1/2"
Largest diameter of cone.....	4 1/2"
Number of steps on cone.....	4
Width of belt required.....	2"
Tight and loose pulleys on countershaft.....	8" x 3"
Speed of countershaft, revolutions per minute.....	150
Domestic shipment, crated, weight.....	631 lbs.



FIG. 11372.

NO. 3 HAND MILLING MACHINE.

DESCRIPTION FIG. 11373.

The arm, outboard center, spindle bearing, micrometer adjustments, etc., are those of our standard design.

The main slide has large oil channels all around and is provided with a T slot, by which the vertical milling head can be set at any position on the slide.

Adjustable plug stops in either direction are provided. The vertical milling head is of the most improved design and is fitted with square gibbing and centrally located stops, by which any tendency to tilt the head is entirely prevented. Fixtures may be mounted on the head instead of the vise shown.

Both vertical and main slides are fitted with rack and pinion motion and long levers, which are adjustable in position.

The machine is also made without arm.

Equipment: 1 No. 3 plain vise and crank; 1 vise holding-down screw; 1 vertical milling fixture with two bolts, nuts and washers; 1 arbor plunger; 1 knee crank; 3 wrenches; 1 oil pot with swinging arm; 1 plain countershaft.

Dimensions of table inside oil pockets.....	5 1/2" x 20"
Vertical adjustment under spindles.....	17 1/2"
Swing under arm.....	11"
Distance from spindle to outboard bearing.....	13"
Adjustment in line with spindle.....	4"
Vertical feed fixture.....	1 1/2"
Length of feed.....	2"
Arbor hole in spindle, B. & S. taper.....	No. 10
Largest diameter of cone.....	10 1/2"
Number of steps on cone.....	4
Width of belt required.....	2 1/4"
Tight and loose pulleys on countershaft.....	12" x 3"
Speed of countershaft, revolutions per minute.....	120
Domestic shipment, crated, weight.....	1,350 lbs.

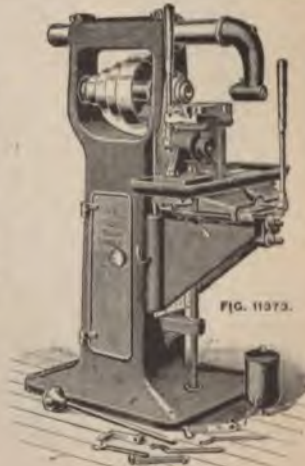


FIG. 11373.

THE FAIRBANKS COMPANY

NO. 2 HAND MILLING MACHINE.

DESCRIPTION FIG. 11374.

The pilot wheel hand feed of the carriage is especially valuable for long work and a quick return, and for milling "spots" which are some distance apart.
Machine furnished complete with overhanging arm, vise, and tight and loose pulley countershaft.



FIG. 11374.

SPECIFICATIONS.	
Center of spindle to overhanging arm.....	4½"
Greatest end of spindle to overhanging arm.....	10½"
Working surface of table.....	5½" x 18"
Longitudinal movement of table.....	12"
Transverse movement of table.....	3½"
Vertical movement of table.....	5½"
Cone pulleys for 2" belt, net weight.....	550 lbs.
Tight and loose pulleys, 10" x 2", revolutions....	150
Shipping weight of machine with counter.....	800 lbs.

NO. 3 AND NO. 3½ HAND MILLING MACHINES.

DESCRIPTION FIG. 11375.

NO. 3 HAND AND POWER FEED MILLER.

Hand rack, hand screw and screw power feed.
Power feed instantly started, stopped or reversed. Machine furnished complete, as shown, including two-speed friction clutch countershaft.



FIG. 11375.

Center of spindle to overhanging arm.....	4½"
Greatest distance end of spindle to overhanging arm.....	12"
Working surface of table.....	6" x 24"
Longitudinal movement of table.....	17½"

Transverse movement of table.....	3½"
Vertical movement of table.....	5½"
Net weight.....	666 lbs.
Counter 10" x 2".....	150 rev.
Shipping weight of machine and countershaft....	950 lbs.

NO. 3½ MILLER.

Working surface of table.....	Same as No. 3 miller except larger range.	Transverse movement of table.....	6"
Longitudinal movement of table.....	6" x 30"	Vertical movement of table.....	14½"
	24"		

PLAIN MILLING MACHINES.

NO. 11 PLAIN MILLING MACHINE.



FIG. 11376.

DESCRIPTION

FIGS. 11376 TO 11379.

Attention is directed to a number of improvements made in these plain milling machines.

A new machine, No. 14A, has been added to this line. This machine, as well as the No. 16A, is provided with power feed and automatic trip and reverse in all directions, and square lock ways and taper gib for the saddle on the knee.

Our direct constant feed, patented, has been applied to the Nos. 14, 14A, and 16A, whereby fine positive feeds are driven from the spindle, and the fast feeds from the countershaft by wide belt or large pulley—which relieves the spindle belt of 30 per cent. of the load, and in addition, the spindle cones on these three machines are made three step for wide belt, and the back gearing increased, which altogether more than doubles the previous power of the machines.

On the Nos. 13 and 13½ machines, the feed cones are interchangeable, which makes available a rate of feed three times as fast as before, and doubles the number of changes, making twenty-four feeds obtainable.

The tables, except on the No. 16A, have a large oil pan all around with finished top edges. This keeps the oil and chips from spreading over the machine, and the top edge of the oil pan adds materially to the available working surface.

The table feed screws are all very large, the increased torsional strength enabling the machine to be forced on the heaviest cuts without straining the screw, and the added wearing surface secures durability.

The table feed screws are quick pitch, giving 1" per turn, which secures rapid handling of the machine, and gives a quick return without any gearing or clutches and are also more efficient than the slower pitches, conforming what theory suggests. These screws will not start back when the feed is tripped under cut.

Power is applied to the table screws in the most direct manner by bronze or hardened steel worm gear direct on the screw, with hardened tool steel worm running continuously in oil, avoiding all intermediate gearing.

The knees are absolutely closed on top and sides and have an extended bearing on the column.

NO. 13 PLAIN MILLING MACHINE.



FIG. 11377.

PLAIN MILLING MACHINES.

DESCRIPTION FIGS. 11376 TO 11379.—Continued.

This most important and far reaching improvement removes the radical weakness of the open knee, gives the solidity and stiffness requisite for heavy cutting and the severe stresses brought about by high speed tool stools and prevents the spring, twist and vibration due to the weakness inherent in a knee open on top and often cut open on sides as well. The extended bearing on the column adds largely to the wearing surface and increases the holding power of the knee, which, combined with the box construction, affords a stronger and stiffer support for the arm and arbor support houses, a point not hitherto considered in the design of the knee, and enables more and better work to be obtained from the tools than was possible before. The strength of the solid extended knee also enables us to provide a large space in the clear between the inside of the arm braces and the face of the column.

Elevating screws telescope, requiring no hole in the floor, and set ball threaded.

Interchangeable hand wheels are provided on the knee and micrometer dials are fitted for all movements.

Rattles are fitted to the knee with taper gibs, giving the greatest solidity with the same ease of movement.

The base or column has a ledge around the bottom to keep oil from spreading over the floor.

A strong support is given to the telescope arm tapering out to a large width around the spindle, and a wide surface and large V_s are provided for the knee.

A large solid steel arm, ground, is provided. On this is mounted a yoke, carrying two centers for tit and bush bearings for arbors, which meets all requirements for light and heavy work. On the largest machine however, two yokes carrying bush centers are provided for the end and intermediate support of the arbor.

The yoke can be quickly removed to mount vertical spindle attachments, etc., without taking out the arm.

NO. 15. PLAIN MILLING MACHINE.



FIG. 11379.

NO. 14A. PLAIN MILLING MACHINE.



FIG. 11378.

Provision is made for binding the braces to the end of the arm itself, so that the arm yoke can be adjusted along the arm, leaving the braces out on the end of the knee.

A screw rod passing through the spindle is provided for holding and removing cutter arbors. Arbors are held with great power, and disturbance of the bearing by pounding action is avoided. On the No. 14 and larger sizes, positive drive for the arbor is provided.

The table feed screw is provided with one fixed and one adjustable nut to take up all play, and is fitted with an adjustable micrometer dial, giving facilities for every kind of spacing work, rack cutting, locating holes in jig boring, etc.

Tests have been made of the capacities of our machines under conditions similar to those existing in practical use. These tests were made with single belts, using a spiral mill $3\frac{1}{2}$ " diameter, $5\frac{1}{2}$ " face, and demonstrate the power of the machines that they work without chatter, and the further fact that the power of the feed belt and feed works is equal to any load the main spindle belt can pull.

Other features of design and construction are specified in detail under the headings of the different machines, together with references to cuts and description of same.

It may be remarked that a large proportion of the work commonly done on a universal milling machine can be done on a plain machine and to better advantage owing to the greater simplicity and stiffness of the plain machine, stronger feed works and longer bearings. A tool room machine is not always a universal milling machine. Adjustments conform to the manufacturers' standard.

All our machines can be fitted with an efficient arrangement of motor drive, by variable speed motor, combining positive drive, great range of speeds, increasing by small increments, and a minimum of gearing.

Specifications on following page.

PLAIN MILLING MACHINES.

DESCRIPTION FIGS. 11376 TO 11379.—Continued.

SPECIFICATIONS.

	No. 11.	No. 12.	No. 13.	No. 13N.	No. 14.	No. 14A.	No. 15.	No. 16A.
Length of automatic feed of table.....	12½"	18"	24"	24"	28"	28"	42"	34"
Adjustment in line with spindle.....	4½"	6"	7"	7"	8"	8"	10½"	10"
Vertical adjustment under spindle.....	12½"	15"	19"	19"	19"	19"	21"	20"
Dimensions of table over all.....	23½" x 61½"	34½" x 9½"	41" x 11½"	41" x 11½"	48" x 13"	48" x 13"	42" x 12"	50" x 12"
Dimensions of table inside oil pockets.....	21¼" x 3¼"	30¼" x 6¼"	37" x 7½"	37" x 7½"	43" x 9"	43" x 9"	42" x 12"	50" x 12"
Greatest capacity for work between column and arm braces.....					18"	21½"	21½"	23½"
Swing under arm.....	2½"	9½"	12"	12"	13½"	13½"	13½"	14½"
Arbor hole in spindle B. & S. taper.....	No. 7	No. 10	No. 10	No. 10	No. 10	No. 10	No. 10	No. 11
Largest diameter of cone.....	6½"	9"	11¼"	11¼"	12½"	12½"	12½"	13½"
Width of belt required.....	2"	2¼"	3"	2½"	4"	4"	3"	4½"
Number of steps on cone.....	3	4	4	4	3	3	4	3
Changes of speed by cone, back gears and countershaft.....	3	4	8	16	12	12	16	12
Automatic feeds in all directions.....	No	No	No	No	No	Yes	No	Yes
Number of feed changes.....	3	12	12	12	20	20	12	20
Capacity of vise furnished.....	4" x 1½"	5" x 2½"	6" x 3½"	6" x 3½"	6" x 3½"	6" x 3½"	6" x 3½"	7" x 4½"
Friction pulleys on countershaft.....	8" x 3", tight and loose	10" x 3", tight and loose	14" x 3"	14" x 3"	14" x 4"	14" x 4"	14" x 4"	14" x 3"
Speed of countershaft, revolutions per minute.....	165	125	80-100	120-160	120-340	120-340	110-320	110-340
Floor space required.....	28" x 36"	47" x 38"	60" x 48"	60" x 48"	68" x 53"	68" x 53"	75" x 58"	76" x 98"
Domestic shipment, crated weight.....	650 lbs.	1,016 lbs.	1,725 lbs.	1,780 lbs.	2,650 lbs.	2,850 lbs.	2,800 lbs.	4,200 lbs.
Foreign shipment, tight boxed, (size) cubic feet.....	22	45	61	63	73	73	81	107
Foreign shipment, tight boxed (weight).....	975 lbs.	1,370 lbs.	2,100 lbs.	2,175 lbs.	3,260 lbs.	3,400 lbs.	3,300 lbs.	5,050 lbs.

NO. 1 PLAIN MILLING MACHINE.



FIG. 11380.

SPECIFICATIONS FIG. 11380.

TABLE FEEDS.

All feeds positive and automatic.

Longitudinal.....	27½"
Transverse.....	8"
Vertical.....	19"
Working surface of table.....	33½" x 10"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to under side of overhanging arm.....	6½"
Front of spindle to arbor bearing in arm pendant without braces.....	16½"
Diameter of largest step on cone.....	10½"
Width of belt on cone.....	2¾"
Extreme floor space.....	90" x 56"
Net weight.....	2,600 lbs.
Domestic shipping weight.....	2,775 lbs.
Export shipping weight.....	2,900 lbs.
Countershaft pulleys.....	12" x 2¾"
Speed of countershaft, revolutions per minute.....	180 and 150

For description see following page.

NO. 2 PLAIN MILLING MACHINE.

SPECIFICATIONS FIG. 11361.

TABLE FEEDS.

All feeds automatic and positive.

Longitudinal.....	29"
Transverse.....	9"
Vertical.....	19"
Working surface of table.....	39" x 10"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to underside of overhanging arm.....	61 1/4"
Front of spindle to arbor bearing in arm pendant, without brace.....	19"
Diameter largest step on cone.....	12"
Width of belt on cone.....	3"
Extreme floor space.....	97" x 62"
Net weight.....	3,000 lbs.
Domestic shipping weight.....	3,250 lbs.
Export shipping weight.....	3,550 lbs.
Countershaft pulleys.....	12" x 3 1/2"
Speed of countershaft, revolutions per minute.....	170 and 140



FIG. 11361.

GENERAL DESCRIPTION FIGS. 11360 AND 11361.

The modern milling machine must be primarily a manufacturing machine. The Kempanith miller, herein described, has recently been completely redesigned, strengthened, and its efficiency increased in every possible way, to adapt it to the greatly increased strains imposed by modern milling methods. It is truly a miller of quality, and we commend its many good features to your careful examination.

Feeds are positive and automatic in all directions. The geared feed changing mechanism provides sixteen changes, ranging from .005 to .200 per revolution of spindle, in geometrical progression, this wide range adapting it to the very heaviest classes of milling. Steel spur gears are used throughout, and by our method of construction, the loss of power through friction is minimized. Each change of feed is readily obtainable by means of levers on the gear box, and a simple and easily comprehended index plate on the box shows the range of feeds, and how to obtain any desired feed.

The gear box is recessed into the column, and is thus rigidly supported without any overhanging part. Its chain driven from main spindle, the sprocket wheel being keyed direct to spindle. The entire mechanism is extremely simple and compact throughout.

All movements have power feed, reversed or automatically tripped at any time, from front of knee, thus bringing all movements of the machine under operator's immediate control without change of position. One lever only is necessary in tripping all feeds, which is a decided advantage in sudden emergency. It acts instantaneously. All feeds can be read in .001" insuring delicate work.

Column is of liberal dimensions without unnecessary metal. Column, base, and bridge for overhanging arm are all cast in one integral piece, substantially ribbed internally, the internal ribs serving both as tie plates for strengthening the column and as a series of handy foot shelves. This is absolutely the most rigid construction conceivable. Base is pan shaped, cranked to hold waste oil and cuttings, a protection to the floors. Column presents broad bearing surface for knee, and is drilled for applying vertical attachment at any future time.

Spindle is of forged steel, ground absolutely true, with hole its entire length, and B. & S. taper hole in front end. Has large bearings, the front bearing tapered, rear bearing cylindrical. Bearing boxes are highest quality bronze, with improved means for adjustment. Nose of spindle is threaded for face milling cutter or chuck, and when not thus used is protected by a collar. Driving cone has four steps, large diameter and wide face, and is powerfully back geared. Sixteen spindle speeds ranging from 16 to 314 revolutions per minute are obtainable through double friction countershaft.

Overhanging arm is a solid steel bar, accurately ground and by removing pendant supporting arbor, may be pushed back flush with column, or be ready for receiving attachments.

Table is of large working surface, with three T slots. Table screw has ball bearing thrust collars; nut is in two sections, with ample means for taking up wear. Is back geared on right end to impart quick return motion. Elevating and cross feed screws may be operated simultaneously by hand without handles interfering.

Elevating screw is telescopic and permits of lowering table full distance of feed without need for screw hole in floor or foundation. Thrust is taken by ball bearing collars.

Double friction countershaft is furnished with each machine.

All bearings are wide, scraped to a perfect fit. All gears are coarse pitch and wide face.

Regular equipment includes countershaft, 1" arbor, No. 3 plain vise with steel face jaws, brace for overhanging arm, outside tool shelf, and all wrenches and accessories shown in illustration.

When specified and at extra cost, we can furnish this machine with vertical, circular and high speed milling attachments, plain or universal index centers, extra arbors, oil pump and piping, and improved motor drive.

NO. 3 PLAIN MILLING MACHINE.

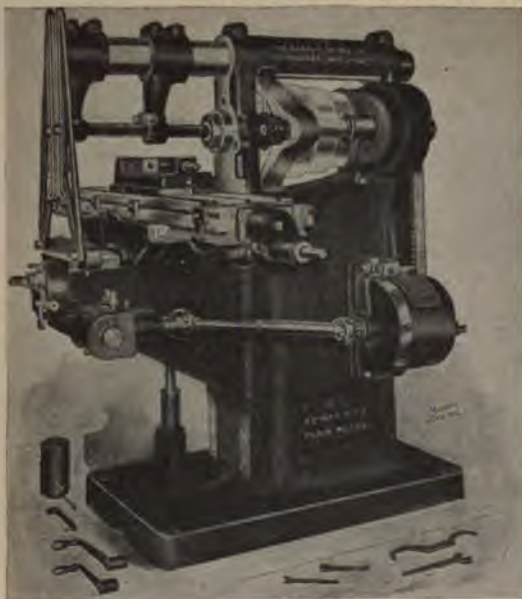


FIG. 11382.

SPECIFICATIONS FIG. 11382.

TABLE FEEDS.

All feeds automatic and positive.

Longitudinal.....	37"
Transverse.....	11"
Vertical.....	20"
Working surface of table.....	46" x 12"
B. & S. taper hole in spindle.....	No. 11
Center of spindle to underside of overhanging arm.....	73½"
Front of spindle to arbor bearing in arm pendant, without brace.....	21½"
Diameter largest step on cone.....	13½"
Width of belt on cone.....	3½"
Extreme floor space.....	114" x 66"
Net weight.....	4,100 lbs.
Domestic shipping weight.....	4,400 lbs.
Export shipping weight.....	4,800 lbs.

DESCRIPTION FIG. 11382.

Milling practice has undergone a remarkable revolution in the past few years. The modern milling machine must be primarily a manufacturing machine. The Kompanith miller herein illustrated and described, has recently been completely redesigned, strengthened, and its efficiency increased in every possible way, to adapt it to the greatly increased strains imposed by modern milling methods. It is truly a miller of quality, and we commend its many good features to your careful examination and study.

Feeds are positive and automatic in all directions. The geared feed changing mechanism provides sixteen changes, ranging from .009 to .260 per revolution of spindle, in geometrical progression, advancing by small increments, the range being selected for greatest efficiency in every day milling. Steel spur gears are used throughout, and by our method of construction, the loss of power through friction is minimized. Each change of feed is readily obtainable by means of levers on the gear box, and a simple and easily comprehended index plate on the box shows the range of feeds, and the necessary combination for any desired feed.

The gear box is recessed into the column, and is thus rigidly supported without any overhanging part. Is chain driven from main spindle, the sprocket wheel being keyed direct to spindle. The entire mechanism is extremely simple and compact throughout.

All movements have power feed, reversed or automatically tripped at any time by improved methods, from front of knee, thus bringing all movements of the machine under operator's immediate control without change of position. All feeds can be read in .001" insuring delicate work.

Column is of liberal dimensions without unnecessary metal. Column, base, and bridge for overhanging arm are all cast in one integral piece, substantially ribbed internally, the internal ribs serving both as tie plates for strengthening the column, and as a series of handy tool shelves. This is absolutely the most rigid construction conceivable. Base is pan shaped, concaved to hold waste oil and cuttings, a protection to the floors. Column presents broad bearing surface for knee, and is drilled for applying vertical attachment at any future time.

Spindle is of forged steel, ground absolutely true, with hole its entire length, and B. & S. taper hole in front end. Has large bearings, the front bearing tapered, rear bearing cylindrical. Bearing boxes are bronze, with improved means for adjustment. Nose of spindle is threaded for face milling cutters or chuck, and when not thus used is protected by a collar. Driving cone has four steps, large diameter and wide face, and is powerfully back geared. Sixteen spindle speeds are obtainable, through double friction countershaft ranging from 15 to 312 revolutions per minute.

Overhanging arm is a solid steel bar, accurately ground, and by removing pendant supporting arbor, may be pushed back flush with column, or be ready for receiving attachments.

Table is of large working surface, with three T slots. Table screw has ball bearing thrust collar; nut is in two sections, with ample means for taking up wear. Hand wheel at right of table is back geared to impart quick return motion, but can be instantly connected to table screw, to give same slow motion as ball crank at left end. Elevating and cross-feed screws may be operated simultaneously by hand without handles interfering.

Elevating screw is telescopic and permits of lowering table full distance of feed without need for screw hole in floor or foundation. Thrust is taken by ball bearing collars.

Double friction countershaft has pulleys 15" diameter for 4" belt to run 165 revolutions per minute (or at 135 and 165 revolutions per minute for sixteen spindle speeds in same direction).

All bearings are wide, scraped to a perfect fit. All gears are coarse pitch and wide face. Regular equipment includes countershaft, 1¼" arbor, No. 4 plain vise with steel face jaws, brace for overhanging arm, outside tool shelf, and all wrenches and accessories shown in illustration.

When specified and at extra cost, we can furnish this machine with vertical, circular and high speed milling attachments, plain or universal index centers, extra arbors, oil pump and piping, and improved motor drive.

NO. 9 PLAIN MILLING MACHINE.

DESCRIPTION FIG. 11383.

TABLE FEEDS.

Longitudinal feed automatic.

Longitudinal.....	36"
Transverse.....	7½"
Vertical.....	20"
Working surface of table.....	36" x 12"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to under side of overhanging arm.....	65½"
Front of spindle to arbor bearing in arm pendant without brace.....	19"
Diameter largest step on cone.....	12"
Width of belt on cone.....	3"
Extreme floor space.....	80" x 65"
Net weight.....	2,600 lbs.
Domestic shipping weight.....	2,700 lbs.
Export shipping weight.....	2,850 lbs.
Countershaft pulleys.....	12" x 3½"
Speed of countershaft, revolutions per minute.....	130 and 160



FIG. 11383.

VERTICAL SPINDLE MILLING ATTACHMENTS.

DESCRIPTION FIGS. 11384 AND 11385.

These attachments can be fitted to milling machines shown in Figs. 11380 to 11383; also to universal machines shown in Figs. 11389 to 11392.

Type C attachment is designed primarily for massive strength and rigidity sufficient to handle without undue strain the very heaviest classes of milling which the power of the main spindle of the machine itself can stand. We call attention to its compact and rigid design, and the absence of any frail construction which would detract from the original strength of the attachment.

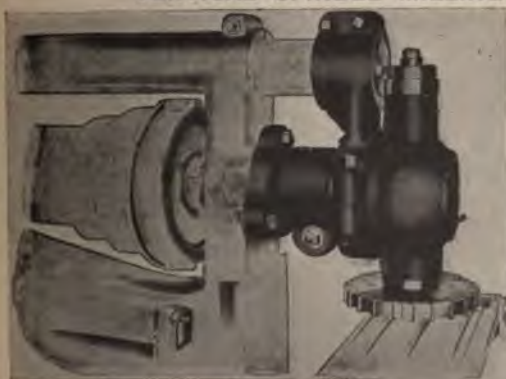


FIG. 11384. SHOWS TYPE C.

Type B attachment is for lighter work and is provided with a rack cutter spindle.



FIG. 11385. SHOWS TYPE B.

PLAIN MILLING MACHINES.

DESCRIPTION FIGS. 11366 TO 11368.

These machines represent the most advanced design, are massive in construction, and built in such liberal proportions that they are capable of exceeding all others in the matter of rigid and accurate production.

The spindles are large in diameter, made of crucible steel, and the larger sizes of machines are all provided with a positive feed mechanism with quick-feed change feature, permitting changing the rate of feed a notch at a time while the machines are doing heavy cutting, and will take any cut that the main driving belt will pull. The Nos. 3, 4, and 5 are fitted with double back gears of wide ratio, giving a high belt velocity, resulting in unusually high spindle power.

The overhanging arm and braces are massive and afford a rigid and substantial support for the outer end of the cutter shaft.

NO. 1B PLAIN MILLING MACHINE.



FIG. 11366.

NO. 5 PLAIN MILLING MACHINE.



FIG. 11367.

The table has unusually great vertical depth, giving it stiffness as a beam to resist being sprung when work is clamped to it. This stiffness is further increased by the stout transverse and horizontal webbing on the inside. It is provided with liberal bearings in the saddle, these being placed at the top of the V-part, making the bearing as wide as the table itself. These, as all other sliding bearings, are at a 45° angle, providing a large surface for a given depth, and they are much deeper than the bearings on other machines. Wear is in all cases taken up by means of adjustable taper gibs.

Convenience in operation is a feature which has been given special attention in the design, all levers without a single exception being on the front or operator's side of the machine within easy reach. This is an unusual feature, but is important, in that convenience in operation is one of the chief factors determining the productive capacity of modern machine tools.

The materials and workmanship entering into their construction are guaranteed to be of the highest quality.

For specifications see following page.

THE FAIRBANKS COMPANY

PLAIN MILLING MACHINES.

Continued.

NO. 8 PLAIN MILLING MACHINE.

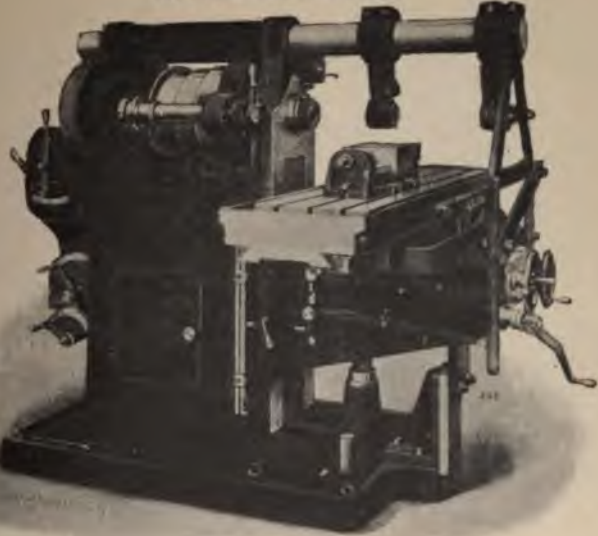


FIG. 11386.

SPECIFICATIONS, FIGS. 11386 TO 11388.

	Not Back Geared.		Back Geared.		Not Back Geared.		Back Geared.		Double Back Geared.		
	0	0M	1	1-B	1N	2	3	4	5	6	
Number of Machines.....	0	0M	1	1-B	1N	2	3	4	5	6	
Longitudinal feed.....	18"	18"	24"	24"	24"	28"	34"	42"	50"		
Cross feed.....	0"	0"	7"	7"	7"	8"	9"	10"	12"		
Vertical feed.....	12"	12"	19"	19"	19"	19"	20"	20"	21"		
From end of spindle to bush in overarm (without braces).....	10N"	10N"	14N"	14N"	14N"	14N"	18N"	24N"	32N"		
Same as above (with braces).....			12N"	12N"	12N"	13N"	16N"	21"	27"		
From face of column to bush in overarm (without braces).....	12N"	12N"	17N"	17N"	17N"	17N"	19N"	27N"	35N"		
Same as above (with braces).....			10"	10"	10"	10"	12N"	16N"	20N"		
From face of column to brace.....	25N" x 8"	32N" x 8"	39N" x 10"	39N" x 10"	39N" x 10"	44N" x 10"	52N" x 12"	64" x 18"	80" x 18"		
Same as above (with braces).....	27N" x 8"	34" x 8"	34" x 10"	34" x 10"	34" x 10"	38N" x 10"	46N" x 12"	56" x 18"	70" x 18"		
Working surface of table.....	8"	8"	8"	8"	8"	8"	8"	8"	8"		
Number of T slots in table.....	3	3	3	3	3	3	3	3	3		
Width of T slots in table.....	N"	N"	N"	N"	N"	N"	N"	N"	N"		
Largest diameter of driving shaft.....	10"	9"	12"	12"	10"	11N"	12"	14"	14N"		
Number of steps on driving shaft.....	4	4	4	4	4	4	4	4	4		
Number of spindle speeds.....	8	10	8	8	8	10	10	12	12		
Range of spindle speeds.....	54 to 378	24" to 378	50 to 300	50 to 300	50 to 300	10 to 384	13 to 350	11 to 326	10 to 391		
Width of driving belt.....	24"	24"	3"	3"	3"	3"	3"	3"	3"		
Number of feed changes.....	5	5	5	5	5	5	5	5	5		
Feet per revolution of spindle.....	.004" to .100"	.004" to .100"	.004" to .100"	.005" to .253"	.005" to .253"	.005" to .253"	.006" to .300"	.006" to .300"	.007" to .300"		
Style of feed.....	1 1/2" Belt	1 1/2" Belt	1 1/2" Belt	General	General	General	General	General	General		
Center of spindle to overarm.....	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"		
Diameter of overhanging arm.....	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"		
Number of vee furnished.....	1 Serrated	1 Serrated	1 Serrated	1 Serrated	1 Serrated	1 Serrated	3 Plain	4 Plain	5 Plain		
Taper hole in spindle (D, E & Standard).....	No. 9	No. 9	No. 10	No. 10	No. 10	No. 10	No. 11	No. 12	No. 12		
Diameter of hole through spindle.....	14"	14"	14"	14"	14"	14"	14"	14"	14"		
Speeds of countershaft.....	125 and 166	162 and 200	90 and 260	90 and 260	146 and 260	139 and 177	143 and 260	150 and 275	170 and 330		
Diameter of countershaft pulley.....	12"	12"	12"	12"	12"	14"	18"	18"	18"		
Floor space.....	70" x 28"	70" x 38"	83" x 70N"	83" x 70N"	83" x 71"	82" x 74N"	100" x 78N"	125" x 84"	124" x 97N"		
Net weight, about.....	1,330 lbs.	1,680 lbs.	2,300 lbs.	2,375 lbs.	2,350 lbs.	2,750 lbs.	4,000 lbs.	5,370 lbs.	7,700 lbs.		
Shipping weight, about, dimensions.....	2,900 lbs.	2,150 lbs.	2,900 lbs.	3,000 lbs.	3,175 lbs.	3,400 lbs.	4,700 lbs.	6,000 lbs.	8,750 lbs.		

NO. 20 UNIVERSAL MILLING MACHINE.



FIG. 11389.

SPECIFICATIONS FIG. 11389.

TABLE FEEDS.

Longitudinal feed automatic.

Longitudinal.....	18½"
Transverse.....	4½"
Vertical.....	13¾"
Working surface of table.....	29½" x 63¼"
B. & S. taper hole in spindle.....	No. 9
Center of spindle to underside of overhanging arm.....	5¾"
Front of spindle to arbor bearing in arm (greatest distance).....	10"
Distance of largest step on cone.....	10½"
Width of belt on cone.....	23¼"
Extreme floor space.....	71" x 44"
Net weight.....	1,300 lbs.
Domestic shipping weight.....	1,400 lbs.
Export shipping weight.....	1,650 lbs.
Countershaft pulleys.....	10" x 23¼"
Speed of countershaft pulleys, revolutions per minute.....	80 and 110

NOS. 1 AND 2 UNIVERSAL MILLING MACHINES.

DESCRIPTION FIGS. 11390 AND 11391.

Feeds are positive and automatic in all directions. The geared feed changing mechanism provides sixteen changes in geometrical progression, ranging from .005 to .200 per revolution of spindle, this range adapting it to very heavy classes of milling. Each change of feed is readily obtainable by means of levers on the gear box, and an index plate on the box shows simply and clearly the range of feeds, and how to obtain any desired feed.

The gear box is recessed into the column and is thus rigidly supported without any overhanging part. It is chain driven from main spindle direct. The entire mechanism is extremely simple and compact throughout.

All movements have power feed, reversed or automatically tripped at any time from front of knee, thus bringing all movements under operator's immediate control. One lever only is used for tripping all feeds, and acts instantaneously. All feeds can be read in .001", and same size threaded nose, as main spindle of miller, making all tools interchangeable. Spindle can be locked at any point for doing straight work. A full range of spirals, right and left hand, can be cut, from one turn in 1" to one turn in 100". Spindle block will rotate through 210° from 15° below horizontal. Index plates are arranged for fine adjustments not possible through movement of index pin. By means of elevating plate, or by swivel base of vise, head can be set at any angle with the table.

Tail stock is of our patent side center type, which allows the use of large diameter shank or end milling cutters to within 1½" of center on the inner side, as well as on top, thus effectually increasing output of work in such instances. Center can be elevated for milling tapers, and tilted for alignment with work.

Column base and bridge for overhanging arm are cast in one integral piece, substantially ribbed internally, the internal ribs serving both as tie plates for strengthening the column, and as a series of handy tool shelves. This is absolutely the most rigid construction possible. Fan shaped base catches waste oil and cuttings, thus protecting the floor. Column is drilled for applying vertical attachment at any future time. Overhanging arm is a solid steel bar.

Table is of large working surface, with three T slots. Table screw has ball bearing thrust collars. Is back geared for quick return motion, on right end. Elevating screw is telescopic and permits of lowering of table full distance of feed without need for screw hole in floor or foundation. Elevating and cross feed screws may be operated simultaneously by hand without handles interfering.

Table swivel block is clamped rigidly to saddle at any angle by our patent level clamping ring, operated by one screw. By this method the clamping strain is thoroughly distributed. Base is graduated in degrees.

Spindle is of forged steel with hole its entire length and B. & S. taper hole in front end. Has liberal bearings of highest grade bronze, front bearing tapered, rear bearing cylindrical. Nose is threaded to receive face-milling cutter or chuck, and when not so used is protected by collar. Driving cone has four steps, large diameter and wide face, and is powerfully back geared. Sixteen speeds are obtainable through double friction countershaft.

Regular equipment includes universal dividing head complete with tail block, centering rest, three index dials, set of change gears for spiral milling and complete chart for operating; countershaft, 1" arbor, No. 3 swivel vise, with detachable base, graduated in degrees, brace for overhanging arm, outside tool shelf, and all wrenches and accessories shown in illustration.

When specified, and at extra cost, we can furnish this machine with vertical, circular or high speed milling attachments, extra arbors, oil pump and piping, and improved motor drive.

(Continued on page 205.)

NOS. 1 AND 2 UNIVERSAL MILLING MACHINES.

DESCRIPTION FIGS. 11390 AND 11391.—Continued.

SPECIFICATIONS FIG. 11390.

TABLE FEEDS.

All feeds automatic and positive.

Longitudinal.....	24½"
Transverse.....	7½"
Vertical.....	18"
Working surface of table.....	35½" x 8¼"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to under side of overhanging arm.....	6¾"
Front of spindle to arbor bearing in arm pendant, without brace.....	16¾"
Diameter largest step on cone.....	10½"
Width of belt on cone.....	2¼"
Extreme floor space.....	85" x 56"
Net weight.....	2,800 lbs.
Domestic shipping weight.....	3,050 lbs.
Export shipping weight.....	3,300 lbs.
Countershaft pulleys.....	12" x 2¼"
Speed of countershaft pulleys, revolutions per minute.....	150 and 180

NO. 1 MACHINE.



FIG. 11390.

NO. 2 MACHINE.



FIG. 11391.

SPECIFICATIONS FIG. 11391.

TABLE FEEDS.

All feeds automatic and positive.

Longitudinal.....	29"
Transverse.....	8½"
Vertical.....	18"
Working surface of table.....	40" x 10"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to under side of overhanging arm.....	6¼"
Front of spindle to arbor bearing in arm pendant, without brace.....	19"
Diameter largest step on cone.....	12"
Width of belt on cone.....	3"
Extreme floor space.....	97" x 62"
Net weight.....	3,300 lbs.
Domestic shipping weight.....	3,550 lbs.
Export shipping weight.....	3,800 lbs.
Countershaft pulleys.....	12" x 3½"
Speed of countershaft pulleys, revolutions per minute.....	140 and 170

For general description of Figs. 11390 and 11391, see page 204.

NO. 3 UNIVERSAL MILLING MACHINE.

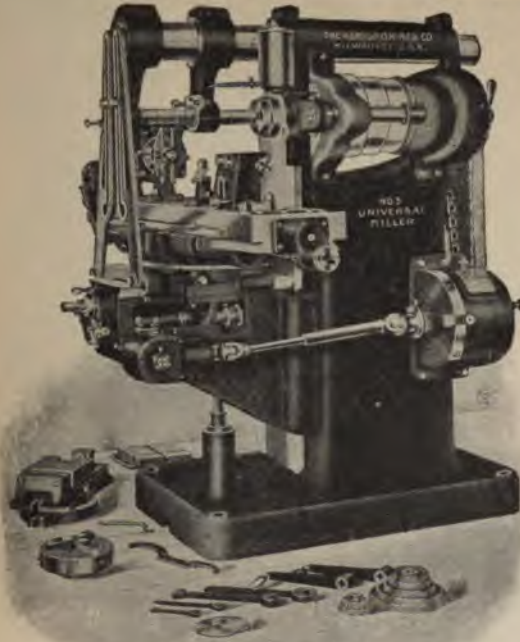


FIG. 11392.

SPECIFICATIONS, FIG. 11392.

TABLE FEEDS.

All feeds automatic and positive.

Longitudinal.....	35"
Transverse.....	10"
Vertical.....	19"

Working surface of table.....	48" x 12"
R. & S. taper hole in spindle.....	No. 11
Center of spindle to under side of overhanging arm.....	7 1/2"
Front of spindle to arbor bearing in arm pendant, without brace.....	21 1/2"
Diameter largest stop on cone.....	13 1/2"
Width of belt on cone.....	3 1/2"
Extreme floor space.....	112" x 66"
Net weight.....	4,800 lbs.
Domestic shipping weight.....	5,100 lbs.
Export shipping weight.....	5,600 lbs.

DESCRIPTION FIG. 11392.

The modern milling machine must be primarily a manufacturing machine. The Kempson miller herein described has just been redesigned throughout to adapt it to the greatly increased strains imposed by modern milling methods.

Feeds are positive and automatic in all directions. The geared feed changing mechanism provides sixteen changes, in geometrical progression, ranging from .000 to .250 per revolution of spindle, this range adapting it to the very heaviest classes of milling. Each change of feed is readily obtainable by means of levers on the gear box, and an index plate on the box shows simply and clearly the range of feeds, and how to obtain any desired feed.

The gear box is recessed into the column, and is thus rigidly supported without any overhanging part. It is chain-driven from main spindle direct. The entire mechanism is extremely simple and compact throughout.

All movements have power feed, reversed or automatically tripped at any time from front of knee, thus bringing all movements of the machine under operator's control.

ator's immediate control. One lever only is used for tripping all feeds, and acts instantaneously. Spiral head is compact and rigid. Centers swing 13 1/4° and takes 26 1/4" in length. Spindle has same size taper hole and same size threaded nose as main spindle of miller, making all tools interchangeable. Spindle can be locked at any point for doing straight work. A full range of spirals, right and left hand, can be cut, from one turn in 1° to one turn in 100°. Spindle block will rotate through an arc of 110°, from 10° below horizontal. Index plates are arranged for fine adjustments not possible through movement of index pin. Provision is also made for compound indexing, and for quick index through spindle direct. By means of elevating plate, or by swivel base of vise, head can be set at any angle with the table.

Tail stock is of our patent side center type, which allows the use of large diameter shank or end milling cutters to within 1/4" of center on the inner side, as well as on top, thus effectually increasing output of work in such instances. Center can be elevated for milling tapers, and tilted for alignment with work.

Column, base and bridge for overhanging arm are all cast in one integral piece, substantially ribbed internally, the internal ribs serving both as tie plates for strengthening the column and as a series of handy tool shelves. This is absolutely the most rigid construction possible. Pan-shaped base catches waste oil and cuttings and protects the floors. Column is drilled for applying vertical attachment at any future time. Overhanging arm is a solid steel bar.

Table is of large working surface, with three T slots. Table screw has ball-bearing thrust collars. It is back-gear for quick-return motion on right end. Elevating and cross-feed screws may be operated simultaneously by hand. Elevating screw is telescopic.

Table swivel block is clamped to saddle at any angle by our patent bevel clamping ring, operated by one screw. By this method the clamping strain is thoroughly distributed. Base is graduated in degrees.

Spindle is of forged steel, with hole its entire length and R. & S. taper hole in front end. Has liberal bearings of highest quality bronze, front bearing tapered, rear bearing cylindrical. Nose is threaded for face milling cutter or chuck, and when not so used is protected by collar. Driving cone has four steps, large diameter and wide face, and is powerfully back-gear. Sixteen speeds, ranging from 15 to 312 revolutions per minute, are obtainable through double-friction countershaft.

Double-friction countershaft has pulleys 15" diameter for 4" belt, to run 165 revolutions per minute (or at 135 and 165 revolutions per minute for sixteen spindle speeds in same direction).

Regular equipment includes universal dividing head, complete with tail stock, centering rest, three index dials, index chart and set of change gears for spiral milling; countershaft 1 1/4" arbor, No. 4 swivel vise, with detachable base, graduated in degrees, base for overhanging arm, outside tool shelf, and all wrenches and accessories shown.

When specified, and at extra cost, we can furnish this machine with vertical, circular, and high-speed milling attachments, extra arbors, oil pump and piping, and improved motor drive.

UNIVERSAL MILLING MACHINES.

NO. 4 UNIVERSAL MILLER.



FIG. 11393.

DESCRIPTION FIG. 11393.

These machines are similar in design and construction to the plain milling machines described on pages 202 and 203; each machine is provided, however, with the swiveling table and the universal head and tail stock. A milling machine chuck is also furnished as part of the usual equipment.

The illustration shows the heaviest type of machine. The No. 3 and No. 4 machines are double back-geared, the No. 1½ and No. 2 machines are single geared, while the No. 1 machine has plain feed.

SPECIFICATIONS.

	NOT BACK-GEARED.		BACK-GEARED.		DOUBLE BACK-GEARED.	
	1	1½	2	3	4	4
Number of Machine.....	1	1½	2	3	4	4
Longitudinal feed.....	20"	20"	25"	30"	35"	
Cross feed.....	7"	7"	8"	9"	10"	
Vertical feed.....	18"	18"	18"	19"	20"	
From end of spindle to bush in overarm (without braces).....	14½"	12½"	14½"	16½"	24½"	
From end of spindle to bush in overarm (with braces).....	17½"	13½"	13½"	16½"	21"	
From face of column to bush in overarm (without braces).....	17½"	15½"	17½"	19½"	27½"	
From face of column to bush in overarm (with braces).....	20½"	16½"	16½"	19½"	24½"	
Distances between face of column and braces.....	20½"	21½"	21½"	24½"	27½"	
Size of table over all.....	37½" x 9"	37½" x 9"	43½" x 10"	51" x 12"	60" x 14"	
Working surface of table.....	35½" x 9"	35½" x 9"	40½" x 10"	48" x 12"	56½" x 14"	
Number of T slots in table.....	3	3	3	3	3	
Width of T slots in table.....	¾"	¾"	¾"	¾"	¾"	
Index centers swing.....	10"	10"	10"	12"	14"	
Index centers take in length.....	16"	16"	21"	20"	33"	
Largest diameter of driving cone.....	12"	10"	11½"	12"	14"	
Number of steps on driving cone.....	4	4	4	3	3	
Number of spindle speeds.....	8	16	16	18	18	
Range of spindle speeds.....	50 to 300	10 to 384	10 to 365	13 to 350	11 to 320	
Width of driving belt.....	3"	2½"	3"	3½"	3½"	
Number of feed changes.....	12	12	12	16	16	
Variations in feed to one revolution of spindle.....	.005" to .253"	.005" to .253"	.005" to .253"	.006" to .300"	.006" to .300"	
Style of feed.....	Geared	Geared	Geared	Geared	Geared	
Center of spindle to overhanging arm.....	6½"	6½"	6½"	6½"	7½"	
Diameter of overhanging arm.....	3½"	3½"	4½"	4½"	5"	
No. of arbor furnished.....	11	11	11	16	21	
No. of vise furnished.....	1 swivel	1 swivel	1 swivel	2 swivel	2 swivel	
Taper hole in spindle (B. & S. standard).....	No. 10	No. 10	No. 10	No. 11	No. 13	
Diameter of hole through spindle.....	¾"	¾"	¾"	¾"	¾"	
Speeds of countershaft.....	90 and 260	146 and 186	139 and 177	145 and 260	150 and 275	
Diameter of countershaft pulleys.....	12"	12"	14"	18"	18"	
Floor space.....	70" x 70½"	70" x 71"	80" x 74½"	98" x 78½"	110" x 84"	
Net weight, about.....	2,500 lbs.	2,700 lbs.	2,930 lbs.	4,200 lbs.	5,470 lbs.	
Shipping weight, about, domestic.....	3,100 lbs.	3,300 lbs.	3,700 lbs.	4,700 lbs.	6,100 lbs.	



FIG. 11394.

HEAVY VERTICAL SPINDLE ATTACHMENT.

DESCRIPTION FIG. 11394.

This attachment is designed to be used on our Nos. 2, 3 and 4 millers shown on pages 202, 203 and 207, in cases where it is desired to do heavy vertical milling. It is strong enough to take any cut within the power of the machine. The main body of the attachment forms a bearing for both miter gears, affording a "self-contained" construction.

The head can be swiveled in a vertical plane through 360°. The circle bearing graduations is large in diameter, thus bringing the graduations far apart.

The spindle has adjustable bearings, similar to the bearings of the main spindle of the machine. It takes the same tools that are used on the main spindle of the machine. It is threaded on outside to take large face mills.

A $\frac{5}{8}$ " 11 drawing-in bolt is provided for holding cutters with shanks.

RACK MILLING ATTACHMENT.

DESCRIPTION FIG. 11395.

This attachment is constructed to revolve the milling cutter at a right angle to main spindle of machine, permitting racks of any length to be cut. It can also be used to advantage in cutting off stock. The attachment is well supported with an upper brace to overhanging arm and is secured on the face of the column which insures rigidity.

It is built for Nos. 3 and 4 plain and Nos. 3 and 4 universal machines, shown on pages 202, 203 and 207. It is strong enough to mill two teeth of three pitch in steel at one cut. The vise for this size will take work 34" long and $5\frac{1}{4}$ " wide. It is 1" deep.



FIG. 11395.

HIGH SPEED MILLING ATTACHMENT.

DESCRIPTION FIG. 11396.

This attachment is designed for use on milling machines shown on pages 198 to 201 and 204 to 206.

For taking light-cuts with small end mills and shank cutters, this high-speed milling attachment can be used to great economical advantage. Through its use, as can be readily seen in the illustration, much higher speeds are obtainable on the attachment spindle than would be possible by using the main spindle of the miller alone. The bracket which supports the two driving pulleys is well braced and rigidly clamped to overhanging arm. This arrangement insures the full number of speed changes obtainable on the main spindle of the miller.

The spindle of this attachment has B. & S. taper hole, and runs in taper bearing in phosphor bronze shell, which is inserted in the taper hole in the main spindle of the miller.



FIG. 11396.

MILLING MACHINE INDEX CENTERS.

DESCRIPTION FIG. 11397.

These centers are of value in milling taps, reamers, small gears, sprocket wheels, and a variety of such work not requiring spiral cutting. These centers being 5" in diameter, or we can furnish when so ordered, raising blocks increasing the swing to any desired diameter. They may be used on any of our millers, and the capacity between centers depends of course upon the length of table on which used, as shown in table below.

The head stock and tail stock are substantial in construction and firmly bolted to table. The spindle is fitted to receive No. 10 B. & S. taper, and has 1 1/8" hole running through. The indexing mechanism consists of an index dial, a small tooth ratchet wheel, and an index plunger bolt. The index dial, also the ratchet wheel, are keyed to the spindle, and can be easily withdrawn. The indexing is accomplished easily and rapidly with one hand. The index plunger bolt is automatically released by a slight upward movement of the hand lever shown, and by the downward movement of same the spindle is revolved and the index bolt engaged in the next notch on the dial. A main advantage in our construction lies in the fact that by using single dials with just the number of divisions required, instead of complicated dials, all calculations and mistakes in indexing are obviated.

Single index dials are furnished with any number of divisions up to and including 60, which range covers all ordinary requirements in this character of work. In ordering, please be careful to state the number of divisions wanted on the index dial. A main advantage in our construction lies in the fact that by using single dials with just the number of divisions required, instead of complicated dials, all calculations and mistakes in indexing are obviated.

Necessary wrenches are always furnished, also dog driver and centers.

Net weight of 8" centers, with one dial, 55 lbs.



FIG. 11397.

UNIVERSAL DIVIDING HEADS.

DESCRIPTION FIG. 11398.

This is a newly designed dividing head, possessing valuable and exclusive features, to which we are pleased to direct attention below. When forming part of universal millers it is fitted with twelve change gears, which will form combinations to cut any spiral likely to occur in practice from a lead of .609" to 92.143" and many beyond this length. When supplied for plain millers, the head remains the same, but the driving gears, change gears, and segment are omitted. It is shown in this shape in the illustration.

Size of Head.	Net Weight About.	Shipping Weight About.
10"	160 lbs.	200 lbs.
12"	250 lbs.	300 lbs.
14"	260 lbs.	310 lbs.



FIG. 11398.

UNIVERSAL DIVIDING HEADS.



FIG. 11399.

SPECIFICATIONS FIG. 11399.

Diameter of Mill Swing.	Angle will Rotate.
8 1/4"	210° from 15° below horizontal, either way
10 1/2"	210° from 15° below horizontal, either way

Taper Hole in Spindle.	Diameter Hole in Spindle.	Diameter R. H. Screw End on Spindle.	Threads U. S. per inch of Screw End.	Net Weight.
No. 9 B. & S.	7/8"	2"	16	85 lbs.
No. 10 B. & S.	1 1/8"	2 1/4"	10	100 lbs.

UNIVERSAL DIVIDING HEAD.

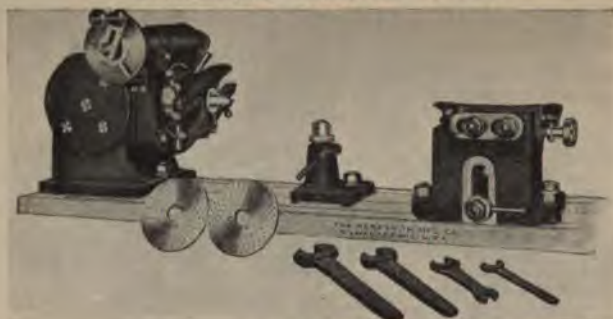


FIG. 11400.

SPECIFICATIONS FIG. 11400.

Diameter will swing.	Angle will rotate.	Taper Hole in Spindle.	Diameter Hole in Spindle.	Diameter R. H. Screw End on Spindle.	Threads U. S. per Inches of Screw End.	Net Weight.
13 $\frac{3}{4}$ "	110° from 10° below horizontal.	No. 11 B. & S.	1 $\frac{1}{4}$ "	3"	8	180 lbs.

MOTOR DRIVEN MILLING MACHINE.



FIG. 11401.

DESCRIPTION FIG. 11401.

It has become so customary during the past few years, in many machine shops, to provide all machines, or in some cases, the larger machines, with individual electric motor drive, that we have found it desirable to make designs for all sizes and types of milling machines so that any one of them may be arranged in this manner. The illustration herewith represents a large sized plain horizontal milling machine with individual electric motor drive. In this particular case, the machine is driven by a variable speed motor of sufficient size to give the best results. The type of motor which is used to operate the various kinds and sizes of machines is naturally variable, depending considerably on the machine itself. All of the milling machines described and illustrated in the foregoing pages, however, can be arranged for electrical operation, if desired. On receipt of inquiries, specifying the voltage and nature of the electrical current on which the motors are to operate, we should be very glad to submit photographs, blue prints or sketches showing the method which it is proposed to follow in attaching motors to these machines, and also quoting prices at the same time. In order to make an intelligent quotation, however, it is very necessary that we be fully informed in regard to the conditions under which the machines themselves, as well as the motors, are to operate.

UNIVERSAL DUPLEX MILLING MACHINE.

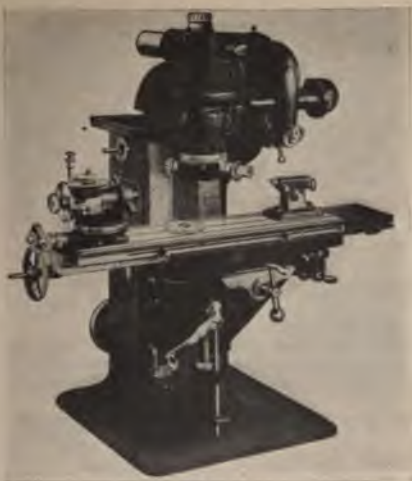


FIG. 11402.

DESCRIPTION FIG. 11402.

This milling machine differs from other types of milling machines in the arrangement of the cutter head which is adapted to be moved and operated at any angle from vertical to horizontal. In addition to the movement of the cutter head, the ram, or frame, on which the head is mounted, has an adjustment in and out over the column, and these combined adjustments of the cutter head and ram permit the operation of the cutter in the most advantageous position, relative to the nature of the work to be operated upon. The change from one position to another of the cutter head or ram can be made in a moment, and it will be noted that the cut at any angle can be carried through the full longitudinal movement of the table.

The machine not only possesses all the advantages of both the ordinary horizontal and vertical types, but the movement of the ram gives an added advantage over the other types for either vertical or horizontal work, and the ability to cut at any angle through the full longitudinal movement of the table is a feature found on none of the other regular types.

We can furnish a subhead for the machine, which is attachable to the face of the main head. This subhead is adapted for cutting spirals in connection with the universal centers of the machine, for rack cutting and for a large variety of regular milling operations where the work cannot be got at with the main cutter head. This subhead can be operated with the main head fixed in any position, and the combined adjustments of these two heads with the ram movement give an almost unlimited cutting range to the machines.

Other special features of the machines are:

- (1) The interior sliding spindle, which can be inserted in a moment or two and which has a sliding movement inside the main spindle, with a hand feed of 3" for drilling, counterboring, etc., at any angle
- (2) The profile stud for cutting of cams or other irregular forms from a pattern.

Main head frame to which the swivel cutter head is attached is 29" long, has bearing 18" long on column, movement in and out over column, 11". Frame is moved by means of hand wheel at side of column and is secured rigidly at any position by means of lever binders.

Overhanging arm, 4" diameter, is fitted in main head frame for use in slab or gang milling, when spindle is set in horizontal position. Swivel cutter head, adjustable to any angle, from horizontal to vertical, in a plane at right angles to the longitudinal movement of work holding table. Head has finely graduated index for setting at angles, and the vertical and horizontal positions are accurately determined by means of positive stops. Head is held securely in position by three quickly operated binder bolts.

Spindle is large, has conical bearings running in hard bronze, is 2 3/8" diameter at front of bearing. Front end takes in No. 13 B. & S. standard taper. A large taper collet which takes in the spring collets and a draw-in spindle used in connection with same are provided with each machine. Mills or arbors with shank of same form as collets will be found to work with great satisfaction. A large nut operated by spanner wrench draws large taper collet into spindle, and a milled follower nut serves as shoulder to draw collet out of spindle. This device does away with all driving on spindle.

UNIVERSAL DUPLEX MILLING MACHINE.

DESCRIPTION FIG. 11402.—Continued.

An interior sliding spindle, operated from back end of head, is provided. This spindle is $1\frac{1}{2}$ " diameter, and has a feed of 3° at any angle in line with the spindle, for radial drilling, milling or counterboring. It takes a No. 7 B. & S. standard taper, and its front bearing is in a No. 13 taper collet. This interior spindle is inserted from back end of spindle, and is held in place by large cap nut screwing on to spindle head. Tapers used in this spindle should be threaded on back end and can then be drawn in or ejected from spindle by means of the milled hand wheel at back.

Driving pulley has three steps and is powerfully back geared.

Table is 44° long and is provided with side water channels with pockets at each end. The tops of channel ribs are planed level with table, making full working width of table 10° . It has automatic feed of 28° in either direction. Feed is reversed by means of a tumbler motion in feed box.

Carriage is $24\frac{1}{2}$ " long and has 12° movement in and out from column.

Knee has vertical range of 18° .

Feeds. There are twelve changes of feeds, ranging from .005 to .160 per revolution of spindle.

Profiling and cam-cutting device is provided.

Height of machine from floor to center of spindle, 43°

Floor space of base, 29° by 31°

Column is provided with cabinet for tools and cutters, and has tray with pockets for wrenches.

Countershaft pulleys are 10° diameter for $2\frac{3}{4}$ " belt, and should run 340 revolutions.

Swivel vise is of very large capacity. Has jaws 7° wide, $1\frac{1}{2}$ " deep, opening $4\frac{1}{2}$ ".

Weight of machine complete, boxed for shipment, about 2,700 lbs.

Outfit furnished with each complete machine consists of interior sliding spindle, one collet holder with draw-in spindle, one $\frac{1}{2}$ " collet, one $1\frac{1}{2}$ " end mill, one cutter arbor on collet shank, one vise, set of wrenches and countershaft.

OPERATIONS PERFORMED ON UNIVERSAL DUPLEX MILLER.

(SEE FIG. 11402.)



FIG. 11403.



FIG. 11404.



FIG. 11405.



FIG. 11406.



FIG. 11407.



FIG. 11408.

These cuts show only a few of the many operations which can be performed with this machine, but will serve to demonstrate the wide range of work which it will handle.

CENTERS FOR UNIVERSAL DUPLEX MILLING MACHINE.

DESCRIPTION FIGS. 11409 AND 11410.

Semi-universal centers, adapted for all kinds of index milling, both straight and taper, excepting routing of spindles.

Full universal centers, including subhead, adapted for all kinds of index milling including spiral cutting.

All machines are made with a solid saddle with long table bearing to secure strength and rigidity, and the subhead which is attachable to face of main cutter head serves to get the necessary angles in spiral cutting. The subhead can be operated with the main cutter head fixed in either a vertical or horizontal position and will be found invaluable for a variety of purposes such as rack cutting, etc. With this subhead much greater angles for spiral cutting can be readily obtained than is possible with the use of the ordinary swivel table or saddle.

Centers have 10° swing, and both centers and subhead are provided with draw-in spindles to take the regular collets, etc., as used in main spindle of machine.

SEMI-UNIVERSAL CENTERS.



FIG. 11409.

FULL UNIVERSAL CENTERS WITH SUBHEAD.



FIG. 11410.



FIG. 11411.

NO. 3 VERTICAL MILLING MACHINE WITH ROTARY.

DESCRIPTION FIG. 11411.

This machine is built in several sizes as noted below.

NO. 2 MACHINE.

High spindle speed is essential to the prolongation of the life of delicate cutters. This machine is built to run at extreme high speed by means of the patented auxiliary spindle support; it is, therefore, of special value to metal engravers and die sinkers.

The vertical movement of the spindle is controlled by the foot lever; the head is nicely counterbalanced to return automatically when the pressure of the foot upon the lever is withdrawn. Both hands are free to guide the direction of the table while the operator's foot governs the vertical movement. These features are much appreciated in machine shops where experimental jobbing is made a specialty.

The spindle is adapted for use with split collets. It is hardened at main bearing, and finished by grinding.

The boxes are made of bronze lined with babbit, and are provided with means of adjustment for wear. Cutters are rigidly secured by a draw bar passing through the center of spindle.

Stop gauge with micrometer readings controls the depth of cut.

Gripping jaws are provided with each machine for securing plates, blocks, etc.

Rotary attachment is usually furnished with a graduated table. Die sinkers sometimes prefer a four-jaw chuck, in which case same will be furnished instead of the circular table, or both may be had interchangeable with each other at additional cost.

VERTICAL MILLING MACHINES.

DESCRIPTION FIG. 11411.—Continued.

Countershaft, when machine is to be used for metal engraving, is provided with tight and loose pulleys 6" in diameter and should be run about 500 revolutions per minute. For machine shop practice, we furnish a double-friction counter, speeds 125 and 400. Unless otherwise specified we shall furnish regularly counter with tight and loose pulleys.

Size of platen.....	17" x 9"	Distance between center of spindle and neck.....	15"
Length of saddle.....	16½"	Vertical adjustment of knee.....	16"
Longitudinal feed.....	12"	Diameter of spindle main bearing.....	1"
Cross feed.....	12"	Diameter of spindle driver.....	5"
Vertical motion of spindle.....	2"	Diameter of rotary table.....	15"
Range of spindle speeds.....	200 to 10,000	Size of hole in spindle (for collet).....	1½"
Greatest distance between spindle and platen.....	17"	Speed of counter, fast, 700; slow.....	125
Greatest distance between spindle and rotary platen.....	13"	Diameter of pulleys on countershaft (2½" belt).....	8" and 12"
		Net weight.....	1,400 lbs.

NO. 3 MACHINE.

The vertical movement of the head is controlled by a hand wheel. The foot lever is, however, provided instead of the hand wheel, when the machine is to be used for fine die sinking purposes, thus enabling the operator to more conveniently manipulate the vertical movement of the spindle. For drilling and boring, the hand wheel is preferable to the foot lever and is usually furnished unless otherwise specified.

Stop gauge with micrometer readings is attached to the head to regulate the depth of the cut.

The spindle is hardened at main bearing, and finished by grinding. It is adapted for use with split collets which are rigidly secured by a draw-bar passing through the center of the spindle.

The boxes are made of bronze and provided with means of adjustment.

Steel-faced gripping jaws are furnished with each machine. These are made to work in combination with the T slots of the main table. Length of jaw, 8"; depth, 2"; length of piece that may be held between jaws, 15".

Hand rotary attachment is usually furnished with graduated table provided with T slots. When machine is to be used for die sinking, a four-jaw chuck can be supplied in place of circular table, or both may be provided interchangeable with each other at additional cost.

Feeds are derived from compounded gears, giving six changes for each change of spindle speed.

Size of platen inside oil pocket.....	28" x 10¼"	Distance between center of spindle and neck.....	16"
Length of saddle.....	28"	Vertical adjustment of knee.....	16¼"
Longitudinal feed, automatic in either direction.....	21"	Diameter of spindle, main bearing.....	1½"
Cross feed by hand.....	12"	Diameter of spindle driver.....	10"
Vertical feed of spindle by hand or foot lever.....	3½"	Diameter of rotary table, inside oil pockets, 15"; outside.....	18"
Feed per revolution of cutter.....	.003" to .043"	Size of hole in spindle (for collet).....	3"
Range of spindle speeds.....	100 to 2,000	Speed of counter, fast, 400; slow.....	100
Greatest distance between spindle and platen.....	17½"	Diameter of pulleys on countershaft (3" belt).....	8" and 12"
Greatest distance between spindle and rotary platen.....	13½"	Net weight.....	2,000 lbs.

NO. 4 AND NO. 4B MACHINES.

The vertical movement of the head is controlled by a powerfully geared hand wheel, thus making it a valuable vertical boring machine. A micrometer stop gauge controls depth of cut, and the head can be rigidly clamped at any point within the limits of its movement.

The spindle is bored to B. & S. taper No. 10. The arbors, cutters and collets are secured by a drawbar which passes through the hollow spindle. The spindle of No. 4B only has threaded nose for securing large surface mills or chucks, and is back geared four to one. This is the only difference between No. 4 and No. 4B machines.

The boxes are made of hard bronze, the bearings are of generous proportions and are provided with means of adjustment for taking up wear. A flat vise is furnished with each machine.

Rotary attachment is fed automatically or by hand with automatic stop dogs for throwing out feed at either end of a segment.

Feeds are derived from compounded gears, giving six changes for each change of spindle speed.

Size of platen inside oil pockets.....	26" x 10¼"	Greatest distance between spindle and platen.....	19"
Length of saddle.....	36"	Distance between center of spindle and neck.....	15"
Longitudinal feed, automatic in either direction.....	28"	Vertical adjustment of knee.....	17½"
Cross feed.....	13"	Diameter of spindle, main bearing.....	2½"
Vertical feed of spindle.....	5¼"	Diameter of spindle driver.....	12"
Feed per revolution of cutter, No. 4 spindle.....	.004" to .058"	Diameter of rotary table, inside oil pockets, 17"; outside.....	20"
Feed per revolution of cutter, No. 4B spindle.....	.004" to .227"	Size of hole in spindle, B. & S. taper.....	No. 10
Range of spindle speeds, No. 4, 50 to 1,500; No. 4B.....	50 to 800	Speed of counter, fast, 400; slow.....	100
Greatest distance between spindle and rotary platen.....	13¼"	Diameter of pulleys on countershaft (3" belt).....	10" x 14"
		Net weight, No. 4, 2,775 lbs.; No. 4B.....	2,825 lbs.

VERTICAL MILLING MACHINES.

NO. 22 MILLING MACHINE.

DESCRIPTION FIG. 11412.

The No. 24 has power feed with reverse and automatic trip in all directions, table, in and out, up and down, and rotary table also. The No. 22 has power feed with reverse and automatic trip to table only. The rotary table of the No. 22 is hand feed. The rotary tables can be quickly mounted and operated in any position along the table. The spindles are our standard taper construction, running in solid bronze, self-aligning boxes, with hardened and ground thrust washers, and provided with disengaging lock gear, which meets the demands of both light and heavy work.

Equipment No. 22: rotary table, 2 nuts, bolts and washers; 2 extra change gears, 1 table stop; 5 wrenches; 1 double friction countershaft.

Equipment No. 24: rotary table; 2 bolts, 5 wrenches; 1 double friction countershaft.

SPECIFICATIONS.

	No. 22.	No. 24.
Dimensions of table inside oil pockets.....	71½" x 37"	14" x 50"
Diameter of rotary table.....	18"	24"
Greatest distance end of spindle to top of table.....	21½"	17½"
Least distance end of spindle to top of table.....	1½"	1½"
Greatest distance end of spindle to top rotary table.....	17½"	12½"
In and out adjustment.....	7"	10"
Length of power feed to table.....	24"	34"
Distance center of spindle to face of column.....	9½"	15"
Taper hole in spindle, B. & S. taper.....	10"	10"
Spindle pulley.....	9"	12"
Width of belt.....	3½"	3"
Number of feed changes.....	12	20
Change of speed by cone and back gear, 8; increased by countershaft to.....	16	16
Friction pulleys on countershaft.....	12" x 3"	14" x 3"
Speed of countershaft, revolutions per minute.....	130-150	125-150
Floor space required.....	35" x 48"	75" x 100"
Domestic shipment, crated, weight.....	1,940 lbs.	3,800 lbs.
Foreign shipment, light boxed, weight.....	2,350 lbs.	4,520 lbs.
Cubic feet.....	52	92



FIG. 11412.

DESCRIPTION FIG. 11413.

These machines are of the most advanced type, embodying the elements of first class vertical boring machines. In addition to the circular work for which they are specially adapted, they will, to a great extent, do the work of a large lathe. For surface finishing, angular and dovetail milling, slide work, etc., they are indispensable to the manufacturer.

The vertical movement of the head is actuated automatically by a worm gear. For boring purposes, it is provided with automatic stop dog which will throw out the feed at any point within its limit.

A micrometer stop gauge at the upper left hand side of the head accurately gauges the depth of cut.

The spindle end is threaded to receive large surface mills. Medium cutters are secured by means of a drawbar passing through the hollow spindle. Spindle driving pulley is mounted upon a patented adjustable auxiliary bearing.

The boxes are made of hard bronze, and bearings are of generous proportions, provided with means of adjustment for taking up wear. A flat vise is furnished with each machine.

Rotary attachment is fed automatically or by hand, with automatic stop dogs for throwing out feed at either end of segment.

Feeds are derived from compounded gears, giving eight changes for each change of spindle speed.

The cut on following page shows the machine fitted up with oil tank, pump, relief valve and connections, which are not regularly furnished.

SPECIFICATIONS NO. 2 MACHINE.

Size of platen inside oil pockets.....	48" x 13"	Distance between center of spindle and neck.....	17"
Length of saddle.....	48"	Vertical adjustment of knee.....	131½"
Longitudinal feed, automatic in either direction..	39"	Diameter of spindle, main bearing.....	3"
Cross feed, automatic.....	14"	Diameter of spindle driver (back geared 5: 1).....	16"
Vertical feed of spindle, automatic.....	7"	Diameter of rotary table, inside, 19"; outside.....	22"
Feed per revolution of cutter.....	.005" to .315"	Size of hole in spindle, B. & S. taper.....	No. 11
Range of spindle speeds.....	10 to 800	Speed of counter, fast, 400; slow.....	100
Greatest distance between spindle and platen.....	20"	Diameter of pulleys on countershaft (3½" belt).....	12" and 18"
Greatest distance between spindle and rotary platen	14½"	Net weight.....	4,500 lbs.

VERTICAL MILLING MACHINES.

NO. 5B MILLING MACHINE WITH ROTARY.

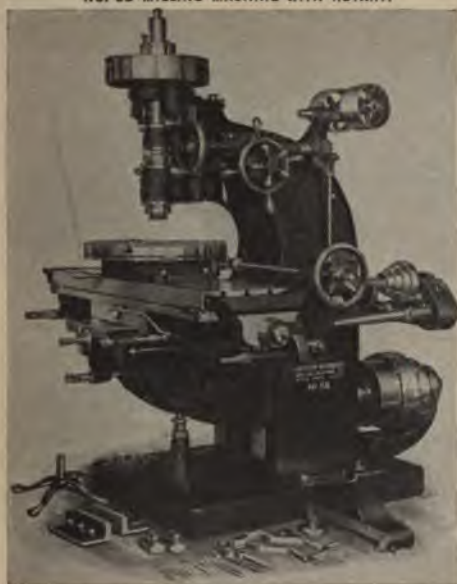


FIG. 11413.

NO. 142 VERTICAL MILLING MACHINE.

DESCRIPTION FIG. 11414.

The accompanying cut illustrates No. 142 vertical universal milling machine with a rotary carriage, which is a separate attachment, and can be readily removed from the flat carriage when not required. By throwing in back gears heavy outside work can be milled, such as stationary engine straps or light locomotive work.

The machines are so arranged that universal centers can be furnished if desired by swinging the horizontal spindle attachment instead of swinging the table as on the ordinary universal milling machine. Spiral cutters can be made, gear cutting, die sinking, heavy slabbing, milling and every operation within the range of these tools can be performed.

DESCRIPTION FIG. 11413.—Continued.

SPECIFICATIONS NO. 5B MACHINE.

Size of platen inside oil pockets.....	43" x 14"
Length of saddle.....	52"
Longitudinal feed, automatic.....	42"
Cross feed, automatic with stop.....	16"
Vertical feed of spindle, automatic.....	9"
Feed per revolution of cutter.....	.004" to .385"
Range of spindle speeds.....	10 to 800
Greatest distance between spindle and platen.....	211½"
Greatest distance between spindle and rotary platen.....	16"
Distance between center of spindle and neck.....	181½"
Vertical adjustment of knee.....	141½"
Diameter of spindle, main bearing.....	3"
Diameter of spindle driver (back geared 5: 1).....	16"
Diameter of rotary table, inside, 19", outside.....	22"
Size of hole in spindle, B. & S. taper.....	No. 11
Speed of counter, fast, 400; slow.....	100
Diameter of pulleys on countershaft, 3½" belt.....	12" and 18"
Net weight.....	4,960 lbs.

SPECIFICATIONS NO. 6 MACHINE.

Size of platen inside oil pocket (standard) ...	49" x 18"
Length of saddle (standard).....	60"
Longitudinal feed, automatic (standard)*.....	50"
Cross feed with automatic stop.....	20"
Vertical feed of spindle, automatic.....	13"
Feed per revolution of cutter.....	.004" to .594"
Range of spindle speeds.....	9 to 340
Greatest distance between spindle and platen.....	30"
Greatest distance between spindle and rotary platen.....	24"
Distance between center of spindle and neck.....	24"
Vertical feed of knee, automatic.....	20"
Diameter of spindle, main bearing.....	3½"
Diameter of spindle driver.....	20"
Diameter of rotary table, inside oil pockets, 24", outside.....	27½"
Size of hole in spindle, B. & S. taper.....	No. 13
Speed of counter: fast, 300; slow.....	130
Diameter of pulleys on countershaft (4½" belt), tight and loose.....	18"

* Can be furnished with feed of 42" or 60" if desired.



FIG. 11414.

THE FAIRBANKS COMPANY

NO. 146 VERTICAL MILLING MACHINE.

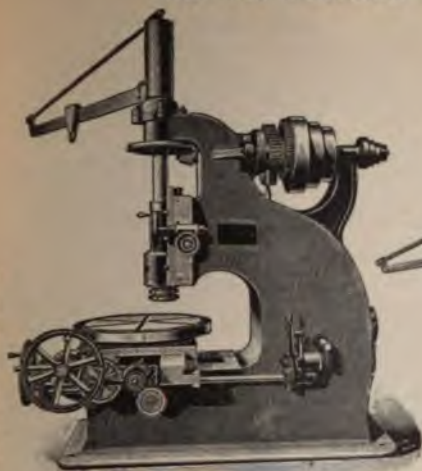


FIG. 11415.

DESCRIPTION FIG. 11415.

Distance from center of spindle to upright...	50"
Will admit under spindle.....	24"
Diameter of carriage over T slots.....	60"
Diameter of carriage over all.....	70"
In and out feed.....	50"
Cross feed.....	65"

DESCRIPTION FIG. 11415.

Distance from center of spindle to upright.....	26"
Will admit under spindle.....	12"
Diameter of carriage over T slots.....	30"
Diameter of carriage over all.....	41 1/2"
In and out feed.....	30"
Cross feed.....	30"

NO. 147 VERTICAL MILLING MACHINE.



FIG. 11416.

DESCRIPTION FIG. 11417.

This is the type of machine that is universally used for the production of large numbers of duplicate parts in the manufacture of guns, pistols, sewing machines, hardware specialties, etc.

The spindle is large, strongly back geared, and fitted with long bearings and provided with a standard Lincoln miller taper hole.

The slide is wide and deep, and the feed works are well protected.

The feed is driven by fast running belt from the back shaft and provided with tightener.

The tail stock is a solid yoke casting, affording the utmost solidity. The tail spindle is adjusted by two large nuts, and the arbor bearing is a hardened steel bushing with take-up for wear and special oiling facilities.

Equipment: 1 No. 15 plain vise and crank; 2 vise holding down screws; 1 drift; 4 wrenches; 1 plain countershaft.

NO. 1 LINCOLN MILLING MACHINE.



FIG. 11417.

SPECIFICATIONS.

Dimensions of table.....	71 1/2" x 28"
Adjustment of spindle above table.....	3 1/4" x 8"
Adjustment in line with spindle.....	7"
Length of automatic feed of table.....	20"
Maximum distance between head and tail stock.....	19"
Largest diameter of cone.....	10 1/4"
Number of steps on cone.....	3
Width of belt required.....	2 1/2"
Number of feed changes.....	4
Tight and loose pulleys on countershaft.....	12" x 3"
Speed of countershaft, revolutions per minute.....	100
Floor space required.....	61" x 58"
Domestic shipment, crated, weight.....	1,475 lbs.
Foreign shipment, tight boxed (74 cubic feet).....	1,800 lbs.

NO. 2 LINCOLN MILLING MACHINE.

DESCRIPTION FIG. 11418.

This is a more powerful machine than the No. 1 Fig. 11417 and has several other advantages—the large oil pan and reservoir and the larger range of adjustments. The spindle has large bearings in adjustable boxes and is driven by a large cone and wide belt. The table is wide and deep and provided with two T slots $\frac{3}{4}$ " wide and center groove. The feed works are thoroughly protected and the feed belt runs at high speed and is provided with an efficient swing tightener.

The saddle has screw adjustment and positive screw stops. The tail stock is of the most solid description and the tail block is firmly clamped and adjusted by hand wheel above. The tail spindle is adjusted by large nuts and the arbor bearing is a hardened steel bushing, adjustable for wear and provided with special oil facilities.

Equipment: 1 No. 15 plain vise and crank; 2 vise holding-down screws; 1 drift; 4 wrenches; 1 plain countershaft.

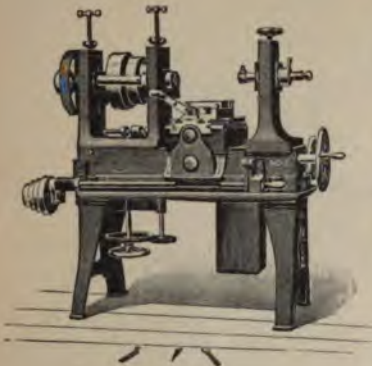


FIG. 11418.

SPECIFICATIONS.

Dimensions of table.....	71 $\frac{1}{2}$ " x 28 $\frac{1}{4}$ "
Adjustment of spindle above table.....	2 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ "
Adjustment in line with spindle.....	7"
Length of automatic feed of table.....	21 $\frac{1}{2}$ "
Maximum distance between head and tail stock.....	20"
Largest diameter of cone.....	11 $\frac{1}{4}$ "
Number of steps on cone.....	3
Width of belt required.....	3"
Number of feed changes.....	4
Tight and loose pulleys on countershaft.....	12" x 4"
Speed of countershaft, revolutions per minute.....	190
Floor space required.....	61" x 60"
Domestic shipment, crated, weight.....	1,825 lbs.
Foreign shipment, tight boxed (74 cubic feet).....	2,125 lbs.

NO. 7 LINCOLN MILLING MACHINE.

SPECIFICATIONS FIG. 11419.

Size of table over all.....	12" x 35"
Working surfaces of platen.....	9" x 29"
Length of saddle.....	24 $\frac{1}{2}$ "
Longitudinal automatic feed.....	20"
Transverse adjustment.....	7"
Vertical adjustment of spindle.....	8"
Greatest distance from end of spindle to bushing in arbor support.....	18 $\frac{1}{4}$ "
Greatest distance from face of column to tail stock.....	22 $\frac{1}{2}$ "
Number of T slots.....	3
Width of T slots.....	$\frac{3}{4}$ "
Diameter of spindle.....	2 $\frac{1}{2}$ "
Length of front spindle bearing.....	6 $\frac{1}{4}$ "
Range of spindle speeds.....	15 to 41
Number of spindle speeds.....	3
Size of hole in spindle.....	$\frac{3}{4}$ "
Size of taper, B. & S.....	No. 10
Largest step on cone.....	10"
Smallest step on cone.....	6"
Number of steps on cone.....	3
Variations of feed to one revolution of spindle.....	.018" to .200"
Number of feeds for each speed.....	8
Ratio of back-gearing.....	6.3 to 1
Diameter of pulleys on countershaft.....	14" x 3 $\frac{1}{4}$ "
Width of driving belt.....	3"
Speed of countershaft, revolutions per minute.....	160
Net weight.....	1,770 lbs.
Weight boxed.....	2,070 lbs.
Contents in cubic feet.....	61

Automatic oiling device can be furnished.

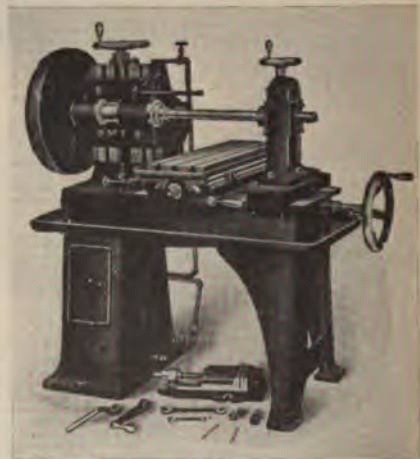


FIG. 11419.

NO. 32 LINCOLN MILLING MACHINE.

SPECIFICATIONS FIG. 11420.

TABLE FEEDS.

Longitudinal feed automatic.

Longitudinal.....	30"
Transverse.....	5½"
Vertical.....	9½"

Working surface of table.....	36" x 12"
B. & S. taper hole in spindle.....	No. 10
Center of spindle to under side of overhanging arm.....	4½"
Front of spindle to inside face of harness or brace for arm.....	16"
Diameter of largest step on cone.....	11"
Width of belt on cone.....	3"
Extreme floor space.....	80" x 54"
Net weight.....	2,300 lbs.
Domestic shipping weight.....	2,450 lbs.
Export shipping weight.....	2,800 lbs.

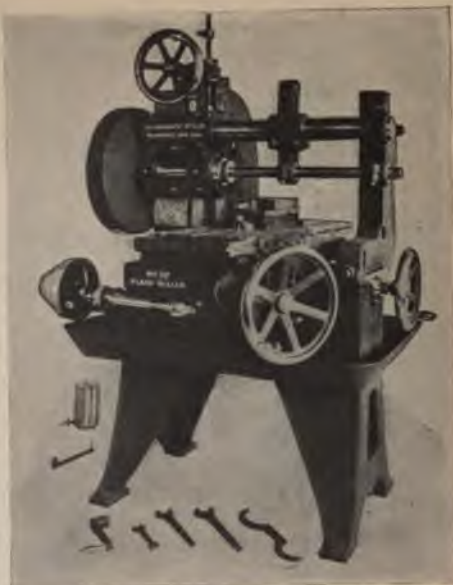


FIG. 11420.

DESCRIPTION FIG. 11420.

The longitudinal feed of table is automatic, through bronze screw of large diameter running constantly in oil, engaging with a thread cut the full length in underside of table. This construction permits effective feed of full length of table in either direction—of distinct advantage in manufacturing purposes. There are four changes, ranging from .011 to .067 per revolution of spindle. These feeds are all readily reversible, without change of belt, and may be automatically tripped at any position by improved methods.

Transverse feed is operated by hand movement of screw, and is indexed, by graduated collar, to read .001".

Vertical adjustment of spindle head is through hand wheel, and is graduated in .001". The outer pendant is simultaneously adjusted by the same movement.

Bed is of liberal dimensions, designed for resistance of strain, and set in a broad pan for catching all waste oil and cuttings. The head frame is very substantial, with broad bearing for spindle head.

Spindle is of forged crucible steel, with hole its entire length, and B. & S. taper hole in front end. Has large bearings, both front and rear being tapered, ground absolutely true, running in bronze boxes, with improved means of adjustment for wear. Nose of spindle is threaded to receive face milling cutter or chuck, and when not thus used is protected by a collar. Driving cone has three steps, large diameter and wide face, is strongly geared at a ratio of 5 to 1. Six spindle speeds are obtainable through double friction countershaft, ranging from 22 to 66 revolutions per minute.

Overhanging arm is a solid steel bar rigidly supported by long bearings in spindle head and the outer pendant, which is firmly clamped at any position, to upright harness. Besides the outer pendant for use with long arbors, the arm carries an inner double ended pendant with large and small bronze bushed bearings, for use either as an intermediate support to a long arbor with end bearing in the outer pendant, or by using reverse bearing, as end bearing for arbors of various shorter lengths.

Table is of very large working surface, with three T slots. Longitudinal feed is full length, as described above.

Double friction countershaft has pulleys 12" in diameter for 3½" belt to run 210 revolutions per minute (or at 175 and 210 revolutions per minute for six spindle speeds in same direction).

All bearings are wide, scraped to a perfect fit, with ample means of compensation for wear. All gears are coarse pitch and wide face. Regular equipment includes countershaft, No. 3 plain vise with steel faced jaws, 1" arbor and all wrenches and accessories shown in illustration, except arbor.

When specified, and at extra cost, we can furnish this machine with extra lengths of table, extra arbors, cutters, oil pump and piping, and improved motor drive.

PLANER TYPE MILLING MACHINES.

NOS. 100, 101 AND 102 MILLING MACHINES.

NO. 101 MACHINE.

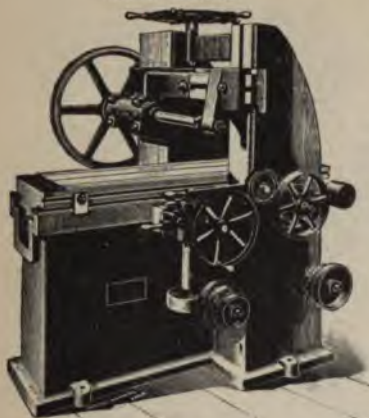


FIG. 11421.

SPECIFICATIONS FIG. 11421.

No. of machines.....	100	101	102
Maximum diameter of cutter.....	7"	8"	10"
Diameter of spindle.....	3½"	4"	4½"
Width of carriage.....	14"	16"	19"
To mill in length*.....	4'	4'	4'
Will admit work in width.....	15'	20'	25'
Maximum distance from center of spindle to carriage.....	15'	20'	22'
Minimum distance from center of spindle to carriage.....	2'	3'	2'

* This length of carriage is standard, but longer carriages can be furnished, if desired.

32" x 26" x 10' MILLING MACHINE.

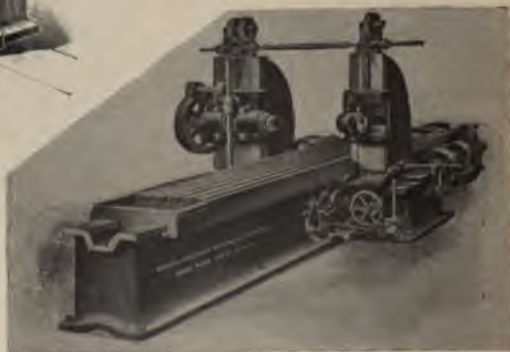


FIG. 11422.

DESCRIPTION FIG. 11422.

The spindle is made of hammered crucible steel, 5" in diameter, has a threaded nose and runs in self-centering bronze boxes with nut and check nut to compensate for wear. The spindle carrier is very heavy and is held firmly to the upright by long gibs. It is elevated by a screw with adjustable dials graduated to thousandths of an inch and has counterbalance for ease of operation. The spindle is driven by a 5" belt on a five step cone, the largest step of which is 23" diameter and the smallest 13" diameter, giving gear ratios of 13½ and 27 to 1, thereby allowing twenty changes of speed. By means of hand lever and quick change gearing, the speed is easily adjusted.

The table is very heavy and is regularly built with five T slots lengthwise and an oil channel the full length and at each end. It travels on flat ways securely gibbed and has a quick return operated by power from a separate countershaft. It can also be moved by the usual hand wheel.

The feed of the table is directly operated through gearing from the main driving cone, giving a range of feed through eight changes from ⅜" to 3½". These changes of feed can be made instantly, by means of a lever, without stopping the machine.

The head may be adjusted from either side of the machine, so that it is not necessary to take the cutters off the arbor in order to change their position in relation to the work.

The bed is extra deep, extending to the floor and making a solid foundation. It is securely braced by heavy cross girders which are evenly spaced throughout the entire length. The bed can be made any length desired.

SPECIFICATIONS.

Working surface of platen.....	120" x 26"
Length of bed.....	168"
Longitudinal feed, automatic in both directions.....	120"
Greatest distance from center of spindle to table.....	28"
Least distance from center of spindle to table.....	2"
Greatest distance from end of spindle to center of table.....	16½"
Least distance from end of spindle to center of table.....	6½"
Greatest distance from end of spindle to tail stock spindle.....	37"
Least distance from end of spindle to tail stock spindle.....	17"
Net weight.....	25,000 lbs.

DUPLEX MILLING MACHINES.

SPECIFICATIONS FIG. 11423.

DIMENSIONS.

Maximum distance between end of spindles..	30"
Minimum distance between end of spindles..	8"
Maximum distance between uprights.....	40"
Maximum distance from spindles to carriage..	10"
Minimum distance from spindles to carriage..	3"
Length carriage.....	52"
Width carriage.....	15 $\frac{1}{4}$ "
Automatic feed.....	30"

NO. 123 DUPLEX MILLER.



FIG. 11424.

DESCRIPTION FIG. 11425.

Spindles of machine 4" diameter, driven with phosphor bronze worm wheels, hardened steel worms; carriage can be made to mill any desired length; machine has eight changes of automatic feed with power quick return; the heads are counter-weighted and can be operated simultaneously (as illustrated at additional cost) or independently.

SPECIFICATIONS.

Maximum distance between ends of spindles.....	32"
Minimum distance between ends of spindles.....	8 $\frac{1}{2}$ "
Maximum distance between uprights.....	41"
Maximum distance from spindles to carriage.....	19"
Minimum distance from spindles to carriage.....	3 $\frac{1}{2}$ "
Width of carriage.....	20 $\frac{1}{4}$ "

NO. 120 DUPLEX MILLER.



FIG. 11423.

SPECIFICATIONS FIG. 11424.

Maximum distance between end of spindles..	22"
Minimum distance between end of spindles..	9"
Distance from center of spindles to carriage..	113 $\frac{1}{2}$ "
Length carriage.....	6"
Width carriage.....	12"
Automatic feed.....	6"

SPECIAL NO. 4 DUPLEX MILLING MACHINE.

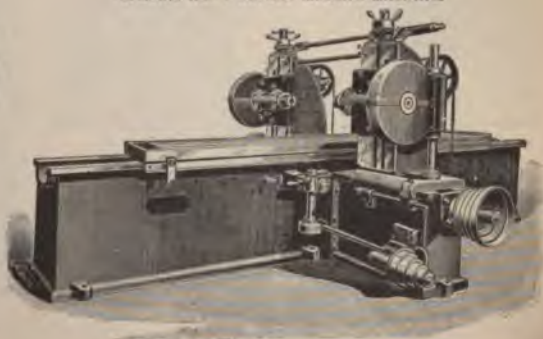


FIG. 11425.

VERTICAL SLAB MILLING MACHINES.

NO. 133 SLAB MILLER.

NOS. 131, 132, 133, AND 134, SLAB MILLERS.

FIGS. 11426 AND 11427.

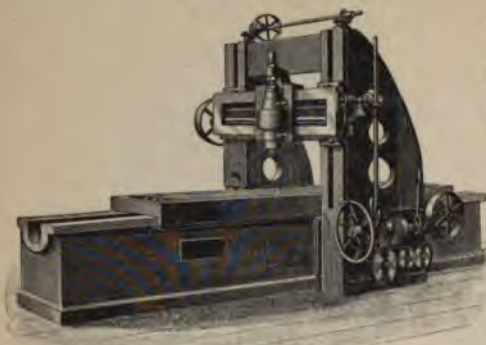
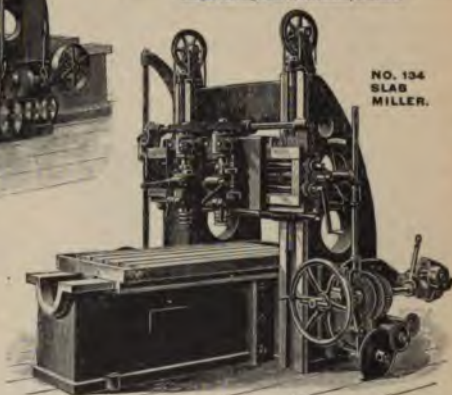


FIG. 11426.

No. of Machine.	131.	132.	133.	134.
Maximum height under spindle.....	12"	24"	30"	27"
Will admit work in width.....	24"	32"	36"	42"
Carriage width.....	18"	23"	30"	30"
To mill in length.....	8'	8'	8'	8'

* Longer carriage can be furnished, if desired.



NO. 134
SLAB
MILLER.

FIG. 11427.

SLAB MILLERS, FIGS. 11426 AND 11427.

With the exception of the No. 131 machine, these millers can be built with two heads on rail as shown in Fig. 11427, if so desired.

DOUBLE SPINDLE MILLING MACHINE.

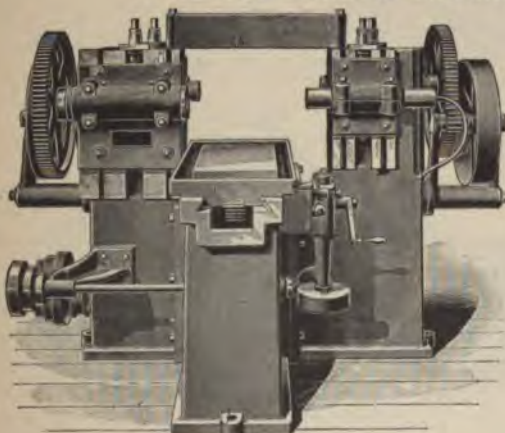


FIG. 11426.

DESCRIPTION FIG. 11426.

Spindles can be raised $10\frac{1}{2}$ " from carriage; distance between the spindles, 16", carriage 13" wide and 18" wide over drip pan; the carriage is 30" long over T slots and 43" long over all; the machine can be made with a carriage with full width, that is, 18", and of any desired length; it is adapted for doing many operations of work where the work can be fastened on carriage and passed under one set of cutters, continuing on with the feed passing under the other set of cutters, finishing the work without resetting.

THE FAIRBANKS COMPANY

NO. 0 VALVE MILLING MACHINE.

DESCRIPTION FIG. 11429.

It is designed for the milling or surfacing of the squares, hexagons or other flatted parts of valves and other brass work, *particularly for finish, but more particularly to secure uniform sizes to suit wrenches or other apparatus as circumstances may require.* The spindles and boxes of these machines are made of *enamel, hardened and ground, and will wear an indefinite time.* The heads with cutters therein can be adjusted separately by the hand wheels at sides and securely clamped when in position. The vertical adjustment can be obtained both in the slide spindle which carries the work and by raising or lowering the whole slide by means of the lower hand wheel.

This machine, as the cut shows, has two cutters whereby two surfaces are operated on at the same time. This machine is designed for brass work only.

SPECIFICATIONS.

This machine is 9" between cutters, and 10" from top of rotating spindle to cutter. Pulleys on spindles 7" diameter, 4" face. Speed of countershaft, 500 revolutions per minute. Tight and loose pulleys on countershaft 8" diameter, 4" face. Driving pulley on countershaft 12" diameter, 10" face. Weight 1,200 lbs. Floor space 66" by 34".

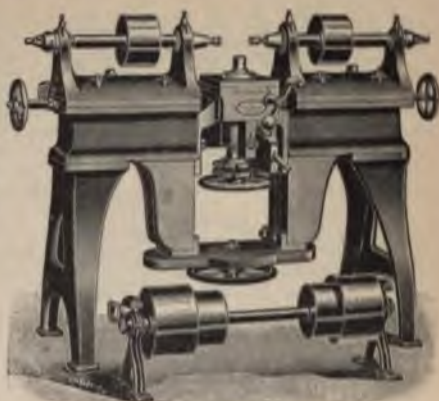


FIG. 11429.

TWO SPINDLE VALVE MILLING MACHINE.

DESCRIPTION FIG. 11430.

This machine is designed especially for milling the square and hexagon parts of valves, nuts and similar work. The piece to be milled is firmly clamped to the vertical spindle by means of the large hand wheel shown below the bed. After milling two opposite sides of the piece (these two sides being milled simultaneously), a partial revolution of the piece through an arc of either 60° or 90° is obtained by giving the lever shown just above the hand wheel, a forward movement. This movement unlocks the spindle, turns it the proper distance, and locks it again, bringing the part into proper position for milling two other sides. In the case of hexagon parts this operation is performed three times, thus producing the six sides of the nut or valve. In the case of square parts, the operation is performed twice only, thus producing the four sides of the square nut or valve.

The heads are adjusted independently at the ends of the bed, so that the cutters can be separated any distance not exceeding 7". The cutters are held concentric by means of spring chucks.

The upright spindle has a vertical adjustment of 3½", giving 4½" as the greatest distance from the center of cutter to top of spindle.

The hardened steel index is adapted to both square and hexagon milling.

The spindle pulleys are 6" in diameter for 2½" belt.

The countershaft has 10" tight and loose pulleys for 4" belt, and should run at a speed of 325 revolutions per minute, which gives a spindle speed of 875.

Floor space of machine, 2' 10" x 4' 3". Weights: net 900 lbs.; crated 1,050 lbs.; boxed for export 1,250 lbs. Cubic measurement boxed 46 cubic feet.



FIG. 11430.

NO. 1 VALVE MILLING MACHINE.



FIG. 11431.

FOUR SPINDLE VALVE MILLING MACHINE.

DESCRIPTION FIG. 11432.

The two knees which carry the four heads are adjustable endwise, so that the cutters can be separated any distance not exceeding 7".

The upper heads are adjustable vertically from $3\frac{1}{4}$ " to $5\frac{1}{4}$ " from the center of the lower heads.

The lower heads are adjustable right and left on the knees, to insure milling both ends of the valve the same size.

The upright spindle has a vertical adjustment of $3\frac{1}{2}$ ", giving 4" as the greatest distance from the center of lower cutters to the top of spindle.

The spindle pulleys are 4" in diameter for $2\frac{3}{4}$ " belt.

The countershaft has self-adjusting idlers for the upper spindles, and is supplied with 12" tight and loose pulleys for 4" belt. It should run at a speed of 180 revolutions per minute, which gives a spindle speed of 720 revolutions.

Floor space of machine, 2' 10" x 4' 3". Weights: net 1,300 lbs.; crated 1,500 lbs.; boxed for export 1,700 lbs. Cubic measurement boxed, 67 cubic feet.

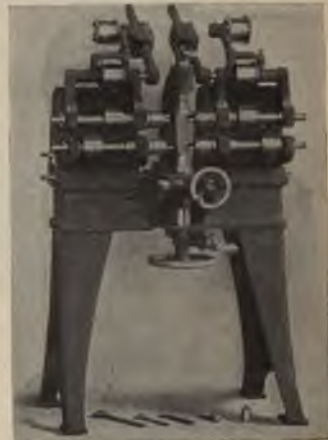


FIG. 11432.

NO. 2.

DIE MILLING MACHINES.

NO. 1.



FIG. 11433.

DESCRIPTION FIGS. 11433 AND 11434.

Figs. 11433 and 11434 show the machines without the die sinking attachment. Speed of No. 1 machine, 350 revolutions per minute.

Speed of No. 2 machine, 250 revolutions per minute.

Description on next page.



FIG. 11434.

DIE MILLING MACHINES.

DESCRIPTION FIGS. 11433 AND 11434.—Continued.

This machine is built for any purpose requiring blanking, trimming or punching dies, such as silverware, jewelry, bicycles, firearms, deep forgings, typewriters and sewing machines. The frame is supported upon trunnions or gudgeons which hold it in any desired position that the operator may secure the best possible light on the surface of the work. The spindle is vertical and adjustable. The cutter projects through an opening in the chuck, in which the work is clamped, and is straight or tapered to suit the amount of clearance required in the die. It is only necessary to drill one hole through the die, and the cutter starting in this hole removes the entire center in a single piece. The chuck is moved in either direction by means of two slides at right angles to each other, and by use of the hand wheels the lines laid out on the surface of the work can be accurately followed. The pointer at the right remains in a fixed position with reference to the cutter when below the surface of the work, and indicates its exact position. This is convenient in cases where a sharp corner is to be made, when the cutter can be lowered and the cutting continued, guided by the pointer, thus leaving very little to be filed.

Two sizes are built, No. 1, the small machine, will hold a plate 6" wide, $\frac{3}{4}$ " thick, and any length; No. 2, the large machine, 10" wide, 2" thick, and any length.

The No. 1 machine can be furnished with or without table.

The No. 2 machine is always supplied with table.

The sinking attachment, Figs. 11435 and 11436, is furnished at extra cost only.

DIE SINKING ATTACHMENT.

DESCRIPTION FIG. 11435.



FIG. 11435.

The die sinking attachment here represented is very useful for roughing out hubs and sinking a large variety of dies, and can be fitted to any of our die milling machines in a very few minutes, thus converting it into a die sinking machine.

Fig. 11436 shows the No. 2 die milling machine with die sinking attachment fitted.



FIG. 11436.

QUICK INDEX MILLING FIXTURE.

DESCRIPTION FIG. 11437.

This fixture is designed to take the place of the universal head in milling operations requiring speed as well as accuracy.

It can be used to great advantage on milling machines, planers, shapers, profiling machines, or upon the table of a drill press, and its many uses will be quickly suggested to any mechanic.

It is made in one size only, the chuck having a capacity up to 2", and is furnished with unhardened jaws which may be shaped, if desired, for holding special work.

It will cut the following number of teeth: 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30, 48, 60.



FIG. 11437.

MILLING MACHINE VISES.

PLAIN VISE.



FIG. 11438.

SWIVEL VISE.



FIG. 11439.

DIMENSIONS OF VISES.

PLAIN VISES, FIG. 11438.

No. of Vise.	Depth of Jaw.	Width of Jaw.	Opens, with Steel Jaw.	Opens, without Steel Jaws.	Weight.
1 P.	1"	4½"	2"	2¾"	19½ lbs.
2 P.	1½"	5½"	2½"	3¼"	30 lbs.
3 P.	1¾"	6½"	3¼"	4¼"	58 lbs.
4 P.	2"	7½"	4½"	5½"	98 lbs.

SWIVEL VISES, FIG. 11439.

No. of Vise.	Depth of Jaw.	Width of Jaw.	Opens, with Steel Jaws.	Opens, without Steel Jaws.	Weight.
2 S.	1½"	5½"	2½"	3¼"	40 lbs.
3 S.	1¾"	6½"	3¼"	4¼"	65 lbs.
4 S.	2"	7½"	4½"	5½"	123 lbs.

PROFILING MACHINES.

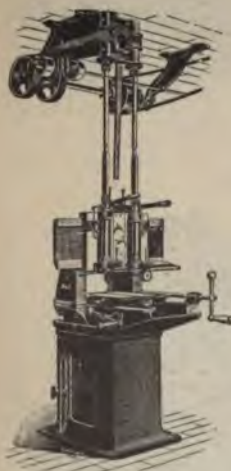


FIG. 11440.

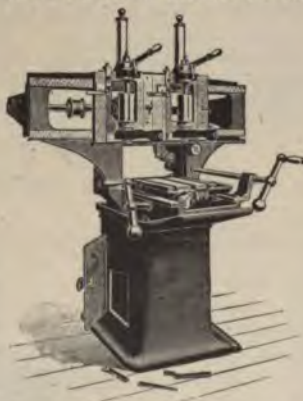


FIG. 11441.



FIG. 11442.

Fig. 11440 shows No. 1 machine with Wesson drive.

Fig. 11441 shows No. 2 machine with belt drive.

Fig. 11442 shows No. 4 machine with belt drive.

Specifications on following page.

PROFILING MACHINES.

SPECIFICATIONS FIGS. 11440 TO 11442.

	Worm Drive Profiling Machine.				Belt Drive Profiling Machine.			
	No. 0	No. 1	No. 2	No. 4	No. 1	No. 2	No. 3	No. 4
Tutting surface of table.....	10N" x 9"	15N" x 12"	15N" x 12"	15N" x 24"	15N" x 12"	15N" x 12"	15N" x 12"	15N" x 24"
Movement of cross-slide.....	14"	20"	20"	20"	20"	20"	20"	20"
Distance from table to cross-slide.....	5N"	5N"	5N"	7N"	5N"	5N"	5N"	5N"
Distance from spindle to cross-slide.....	14"	14"	14"	14"	14"	14"	14"	14"
Diameter of spindle.....	No. 7	No. 7	No. 10	No. 10	No. 7	No. 10	No. 7	No. 10
File in spindle, N. & S. Taper.....	2" or 3N"	4" or 4N"	3N"	4"	4" or 4N"	3N"	3N"	3N"
Distance spindle to former-pin center.....	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"
Up-and-down movement.....	3N"	3N"	3N"	3N"	3N"	3N"	3N"	3N"
Width of T slots in table.....	12"	10"	10"	10"	10"	10"	10"	10"
Distance between uprights.....	12.10.8 x 3	12.10.8 x 3N	12.10.8 x 3N	12.10.8 x 3N	12.10.8 x 3	12.10.8 x 3	12.10.8 x 3	12.10.8 x 3
Pressure, worm pulley on countershaft, Worm drive.....	400	350	300	300	14 x 3	14 x 3	14 x 3	14 x 3
Speed of countershaft, revolutions.....	.....	.....	.....	.....	14 x 3	14 x 3	14 x 3	14 x 3
Pressure pulley on countershaft.....	.....	.....	.....	.....	8" 100	8" 150	8" 200	8" 150
Flare space required.....	34" x 29"	31" x 26"	22" x 20"	22" x 22"	20" x 24"	20" x 24"	21" x 25"	20" x 26"
Net shipping weight.....	1,178 lbs.	2,320 lbs.	2,300 lbs.	2,143 lbs.	2,015 lbs.	2,300 lbs.	1,873 lbs.	1,925 lbs.
Factory shipping weight (right hand).....	1,450 lbs.	3,130 lbs.	2,200 lbs.	2,000 lbs.	2,000 lbs.	2,300 lbs.	2,100 lbs.	2,075 lbs.
Color test.....	42	84	86	70	80	84	64	70

NO. 3H PROFILING MACHINE.

DESCRIPTION FIG. 11443.

The vertical movement of the head is secured by manipulation of a compound geared hand wheel; but the machine may also be provided with the foot lever for controlling this vertical movement.

A micrometer stop gauge for regulating the depth of cut is provided at the left hand side of the head.

The spindle is bored for use of split collets; arborers and cutters are secured by means of a draw bar passing through the center of spindle. The spindle is hardened at the main bearing and finished by grinding.

The boxes are made of hard bronze and bearings are of generous proportions, provided with means of adjustment for taking up wear. A lat vise is furnished with each machine. The spindle pulley is independently mounted upon an adjustable anti-friction bearing (patented), by which means the spindle is relieved from belt strain, and prevented from overheating when running at the extraordinary high speed which is necessary when using cutters of small diameter.

Handles which manipulate the lateral feeds of table may be adjusted to a higher or lower position to suit the convenience and comfort of the operator.

SPECIFICATIONS.

Size of platen inside oil pocket.....	28" x 10 1/4"
Length of saddle.....	28"
Longitudinal feed.....	27"
Cross feed.....	10"
Vertical feed of spindle.....	3 1/2"
Feed per revolution of cutter, hand feed only.....	.....
Range of spindle speeds.....	100 to 2,000
Greatest distance between spindle and platen.....	17"
Distance between center of spindle and neck.....	16"
Vertical adjustment of knob.....	10 1/2"
Diameter of spindle, main bearing.....	11 1/2"
Diameter of spindle driver.....	10"
Size of hole in spindle (for collet).....	3/4"
Speed of counter; fast, 400; slow.....	100
Diameter of pulley on countershaft (3rd belt).....	8" and 12"
Net weight.....	1,800 lbs.



FIG. 11443.

SEMI-AUTOMATIC PINION OR GEAR CUTTER.

DESCRIPTION FIG. 11444.



FIG. 11444.

The cut shown illustrates the head and table of pinion or gear cutter, adapted to cut the same up to 3" in diameter, and twelve pitch or finer.

The index head is fitted up with a hollow spindle. Spring chucks, which are quickly opened or closed by the drawing-in spindle and the hand wheel shown on the left, are designed to be used to hold either the shank of pinion, if cut from the solid or one end of the mandrel on which gear blank is placed. A slight movement of the hand wheel is sufficient to close chuck, and the opposite end of shank or mandrel can be supported by the tail stock and center shown.

The index head and tail stock are attached to a sliding table, which is traversed in a right line with the cutter arbor by means of hand lever, pinion, and rack. The index spindle is revolved by a pawl which, by a neat mechanical device, gets its motion from a connection with and from the movement of the sliding table. In operation, while the table carrying the head and work is being fed by a movement of the hand lever toward the cutter, the index arbor is securely locked in place, and the pawl is dropping back into position to again engage with the index. When the table has been moved forward sufficient to pass work by the cutter, the movement of the hand lever is reversed, and as the table and work are being carried back, the index is unlocked, the pawl engages with the index at any point desired, the same being governed by the adjustable shoe or guard,

which can be set so as to keep the pawl out of engagement until the proper time for the movement of index to commence. The reverse movement being continued until the table has returned to its first position, the pinion or gear blank is securely locked, and in place for the cutting of the next tooth. Thus it will be apparent that after the machine has been properly adjusted, the operator has simply to manipulate the hand lever, the indexing being done both automatically and positively. The indexing arrangements will admit of adjustment to cut seven or more teeth with a proper index gear. With the machine is one index gear with 120 teeth, and without charge we will furnish one other index cut as the purchaser may request. The 120 index can be utilized to cut 120, 60, 40, 30, 24, 20, 12, 10, and 8 teeth.

The spindle of the cutter head has a No. 1 Morse taper hole in the front end, to which a cutter arbor to take standard cutters $\frac{1}{8}$ " hole is fitted and furnished. The spindle runs in split brass boxes, and has a limited end adjustment by screw collars on each side of the front bearing.

The two-speed pulley on spindle is $3\frac{1}{2}$ " and $2\frac{1}{2}$ " diameter, $1\frac{1}{4}$ " face. The corresponding pulley on the countershaft is $1\frac{1}{2}$ " and $1\frac{1}{2}$ " diameter and same face. The tight and loose pulleys are 5" diameter and $2\frac{1}{4}$ " face. Driving the tight and loose pulleys 450 turns per minute will give about 2,500 turns of the cutter.

For the index head we furnish a spring chuck with hole .4", unless otherwise specified. We make thirty-seven sizes of these chucks, holes in same varying by hundredths of inch and ranging from .4 to .04. We will furnish any one size selected with the machine, and extra chucks at extra cost.

We build the same machine with the index head and spindle arranged to swivel so that bevel or miter gears can be cut. Many of the small steel dental burrs or cutters are made in this style of machine.

FULL AUTOMATIC GEAR CUTTER.

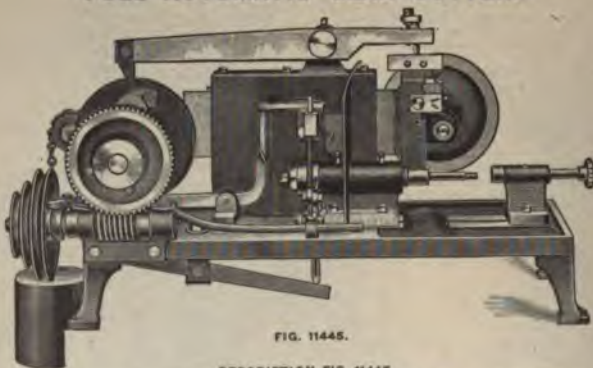


FIG. 11445.

DESCRIPTION FIG. 11445.

This machine is designed to meet the modern demand for rapid production at low cost. It is especially adapted for making small bevel gears, pinions, spur gears, etc. up to 4" in diameter, and cutters of irregular shapes. It will cut teeth in blanks, single or in stacks 2" long.

Owing to the simplicity of construction there is little chance for wear, and it can be run at the highest possible speed without vibration or noise.

It has two changes of speed for cutter spindle and nine for feed mechanism.

Both spindles have taper bearings with compensation for wear.

The irregular shapes are obtained by changing the shape of the interchangeable cam on spindle slide.

The cutter works nine-tenths of the time as it is clear of the work while returning, and the indexing (which is positive) is done at the same time.

The motion of the cam which carries the cutter is controlled by a cam which is changed quickly and easily from one to another.

These cams can be furnished with any throw up to $2\frac{1}{2}$ ".

FULL AUTOMATIC GEAR CUTTERS.

DESCRIPTION FIGS. 11446 AND 11447.

Capacity of Nos. 1 and 2 Automatic.—The No. 1 style will handle work on all kinds of material ranging from pinion rods $\frac{1}{8}$ " diameter fifty pitch, to 2" diameter sixteen pitch. Will cut single blanks or when possible to stack a number of blanks, will cut $3\frac{1}{2}$ " face.

The No. 2 style will cut from smallest gear up to 8" diameter, $4\frac{1}{2}$ " face, twelve pitch and finer.

Indexing Arrangements.—With suitable index plates provision is made on No. 1 machine to automatically index a circle into four divisions and from that any number desired, up to 180 divisions. The No. 2 machine from 4 to 500. By special arrangements a greater number of divisions can be secured. We have a special dividing machine for producing index plates of great accuracy. The index plate used on No. 1 style is 7" diameter, on No. 2, 10" diameter. Index movements are positive and the work spindle is locked in rigid position when tooth is cut. Completed work can be depended on to equal the accuracy of master plate. Index plates can be used for division of circle either into the same number of parts as there are teeth in plate, or any number of parts that will divide evenly into same. Thus, a 96 index plate answers for 96, 48, 32, 24, 16, 12, 8, or 4 divisions. For stock work we recommend index plates with exact number of divisions wanted. An automatic trip for feed is provided that throws same out on completion of last tooth.

We claim great range, reliability and simplicity of indexing arrangements.

Forms of Heads.—Nos. 1 and 2 style machines can be furnished with either of following heads.

Style A form is shown in illustration of No. 2 machines. The spindle has taper hole in front end to receive the hardened steel center and is fitted with face plate with slot into which tail of clamping dog can be secured. This is the common form of construction.

Style B. The illustration of No. 1 machine shows this form of head. The tool steel spindle is opened on the front end to receive split spring chuck. The throat of the spindle is hardened and ground, the spring chuck is operated by a hand wheel on the out end, similar construction being used to that in the regular jeweler's bench lathe heads. In the No. 1 machine the No. 3 bench lathe chuck is used. These can be furnished in various sizes from .04" to 4" openings. Unless otherwise specified we furnish regularly a chuck with $3\frac{1}{2}$ " hole. The ends of larger arbors can be turned to this size and on certain classes of work much time is saved in handling it, as it does away with all necessity for using and attaching the ordinary dog.

In case it is desired to do certain work on centers we can furnish as listed a head center made in the same form as a chuck blank and with small face plate attached.

In the No. 2 machine the No. 4 bench lathe spring chuck is used opened with $\frac{1}{8}$ " or such size hole as specified. These chucks can be made with protruding or step jaws for holding odd shaped blanks.

Tail Stock.—These machines index while the cutter is over the tail stock end of the arbor and the spindles in tail stock are flattened and grooved to allow for the cutting of small work close to center line.

Spindle or Cutter Arbor.—The main spindles run in adjustable phosphor bronze bearings or boxes. The front box is provided with end adjustment for locating cutter in reference to work centers. As regularly furnished the cutter arbors will receive $3\frac{1}{2}$ " hole cutters. Other forms of cutter end can be supplied. The spindle is hollow and arbor can be forced from spindle end by means of threaded rod from back end.

Feed and Adjustment of Table.—The feed is by cam, which works against a fixed bearing roll on the slotted faced arm shown at the extreme right of the illustrations and which arm is pivoted at the lower end. By the adjustable rod shown, connection is made to the table. If the out end of the connecting rod is locked in the dotted arm near its pivoting point, it will be seen that there will be a very slight end movement of the table. While if attached at various positions up to the extreme end of the slotted arm, the amount of throw will be increased correspondingly. After the proper throw provides means for making the cut at any desired location between the first position. On the No. 1 machine the energy to do this is stored up in the vertical spring, and on the No. 2 machine in the suspended weight. That the return may be quick and positive without excessive jar on the machine parts we have lately added on No. 2 machine, a liquid check with adjustable relief connection so that on quick or slow speed, short or long throw, the table will return instantly and at the same time its travel will be under such control as to prevent undue strain on any of the operating mechanism.

NO. 1 MACHINE



FIG. 14446.

NO. 2 MACHINE.



FIG. 11447.

table is determined, the screw adjustment in connecting arm or rod the head and tail centers, thus a minimum throw of from $\frac{1}{8}$ " to the capacity of the machine is available. This adjustment is so convenient that the throw of the machine can be set just sufficient to do the requisite work, thus avoiding any waste time, and accomplishing results which with the old form of construction would require a great variety of cams.

The two adjustments of variable throw and table feed are extremely desirable and will be appreciated by operators of machines of this class. At the completion of a cut the roller leaves the point of the cam and table is returned by the quickest possible method to its first position. On the No. 1 machine the energy to do this is stored up in the vertical spring, and on the No. 2 machine in the suspended weight. That the return may be quick and positive without excessive jar on the machine parts we have lately added on No. 2 machine, a liquid check with adjustable relief connection so that on quick or slow speed, short or long throw, the table will return instantly and at the same time its travel will be under such control as to prevent undue strain on any of the operating mechanism.

FULL AUTOMATIC GEAR CUTTERS.

DESCRIPTION FIGS. 11446 AND 11447.—Continued.

Other Good Features.—The table supporting knee is locked to place by two bolts which pass entirely through a recessed slot in vertical column slide, thus giving extreme rigidity to this connection.

The hand wheel on the elevating screw is graduated to show variations of thousandths of an inch.

Countershaft, etc.—The cone pulley on cutter spindle of No. 1 machine has three steps, 10", 6½", and 3" diameter, 2½" face. On countershaft is corresponding cone and pair of 8" by 2½" face tight and loose pulleys. A speed of 350 revolutions per minute will give a spindle speed of from 100 to 1,100 revolutions per minute. This gives fair range for both brass and steel cutting. Where a wider variation is wanted a double-speed countershaft as mentioned below can be furnished. The cone on cutter spindle of No. 2 machine has three steps, 13½", 12", and 10½" face. On countershaft a cone with three steps 9¼", 7½", and 6" face, and a pair of tight and loose pulleys 12" diameter 2½" face. This counter at speed of 150 revolutions per minute will give cutter speed of 75, 132 and 190 revolutions per minute. If both brass and steel are to be cut a double countershaft with extra set of 5" x 2½" tight and loose pulleys is recommended, and if these pulleys are run 640 revolutions per minute, speeds of 800, 636 and 327 can be obtained on spindle.

Oil Pump, etc.—A geared oil pump tank piping can be applied at extra cost. Photograph of outfit on application.

Special Attachment for Cutting Internal Gears.—For work within following range, we can furnish an extension or geared cutter drive to fit to cutter spindle end on style B machines and by holding work by expanding chuck, face plate fixture or chuck, the blank can be indexed and teeth cut on inside opening. On No. 1 machine to use regular cutter drive blanks with holes 1½" diameter and larger can be cut. The outside of blank must not exceed 5". The No. 2 machine will cut in same manner from 1½" holes up, blank not to exceed 8" diameter on outside. On receipt of sample gear, or full dimensions drawing of same, will make price on suitable outfit.

Special Attachment for Cutting Face or Crown Gears.—Where gears of this kind are to be cut in reasonable quantities we have applied a fixture on the following principle. Fitted to work arbor spindle, a shank on end of which is miter gear. Mounted on ways or slide a block in which were bearings for corresponding miter gear and a work arbor with face plate. The gears brought into mesh and work located, the regular indexing mechanism will revolve the horizontal blank and the cutter will traverse blank from outside toward center of same. Blanks up to 8" diameter can be handled. Price based on receipt of sample gear or dimension sketch.

	CAPACITY.	No. 1.	No. 2.
Will cut gears to maximum diameter of.....		5"	8"
Will cut gears with face of.....		3½"	4½"
Will cut gears pitch and finer.....		16	12
	WEIGHT.	No. 1.	No. 2.
Machine and counter.....		475 lbs.	775 lbs.
Machine and counter crated.....		666 lbs.	950 lbs.
Machine boxed, cubic feet.....		34	46

NO. 11 FULL AUTOMATIC UNIVERSAL PINION OR GEAR CUTTER.

CUTS BEVEL, MITER AND SPUR GEARS.

DESCRIPTION FIG. 11448.

Capacity is about the same as our No. 1 automatic, shown in Fig. 11446, but in addition to the work handled on that, will cut bevel and miter gears 18 pitch and finer. Will cut spur gears 5" diameter same pitch, and in stacks up to 3½" face. Bevel gears any angle from spur to face gears.

Spindle is made of tool steel, provided with end adjustment and taper hole for cutter arbor. An arbor is furnished with each machine to take cutters with regular ½" holes, other styles made to order.

Indexing Arrangements.—With machine, unless otherwise specified an index plate with 120 divisions is furnished. This can be used for division of circle into any number of parts, four or more that will evenly divide into 120. Plates with any number of divisions can be furnished. We recommend for stock work plates with exact number of divisions required.

Forms of Heads.—The machine can be supplied with either the style A or style B head as described in connection with our Nos. 1 and 2 gear cutters. The style B form is very convenient for many bevel gears which can be held by the hub, using special protruding jaw chucks.

Tail Stock.—Center in tail stock is grooved to allow for cutting small pinion rods close to center.

Feed and Adjustment.—In this machine while work is being done, the table is stationary, but is provided with screw end adjustment for bringing work to desired relation with cutter spindle. The cutter spindle is carried in an adjustable slide which can be set to have a horizontal movement to cut spur gears, and in any intervening position from horizontal to vertical for cutting bevel or face gears. The maximum travel in all cases is 4". The feed or travel of slide is governed by a cam working against a reciprocating arm, and ready adjustments are provided so that any desired amount of travel from minimum to maximum can be obtained by use of single cam. The hand wheel on elevating table screw and table feed screw are graduated to show thousandths of inch movement.

Countershaft.—As regularly furnished has tight and loose pulleys, 8" diameter, 2½" face and speeded at 350 revolutions per minute, will provide cutter speeds of 100, 350, 1,160 revolutions per minute.

The two-speed countershaft referred to in description of No. 1 automatic can also be used.

When ordering it is desirable that we have information as to work that is to be handled, and the supplying of proper feeds and speeds will receive consideration.

Weight, 525 lbs.



FIG. 11448.

20" SEMI-AUTOMATIC GEAR CUTTING MACHINE. FOR SPUR AND BEVEL GEARS.

SPECIFICATIONS.

Capacity:	
Diameter.....	20"
Diameter with outside support.....	18"
Face.....	5"
Diametral pitch in steel.....	8"
Diametral pitch in cast iron.....	6"
Diameter pitches can be cut by taking stocking cuts.	
Cutter arbor takes holes, both.....	5/8" and 1 1/2"
Work spindle B. & S. taper hole.....	No. 10
Countershaft pulleys (on machine).....	8" x 2 1/4"
Countershaft revolutions.....	125
Face space.....	20" x 40"
Net weight.....	750 lbs.

Equipment includes all necessary change gears and indexes for divide and feed; gauge for centering cutter; pair of centers and driver; rim support for gears; outside support for work arbor; wrenches; and belting required on the machine.

Oil pump and fittings when desired at extra cost.



FIG. 11449.

DESCRIPTION FIG. 11449.

This machine was designed to meet the requirements of a semi-automatic machine to cut the light and medium class of spur and bevel gears. It has been found, by actual experience, that a boy can turn out the work for which this machine was designed, in competition with higher priced automatic machines, and without in any respect sacrificing the quality or accuracy of the output. Especial attention has been given to obtain the highest accuracy in the gears produced.

Operation is simple. The cutter is fed through the work, by power, the feed being automatically released at the end of the cut. The operator then returns the cutter slide and indexes the blank, previous to engaging the lead for the next space.

Index wheel is of large diameter. It is made in halves, and is hobbed in place by a method which insures the highest accuracy in the divisions. The index wheel on each machine is an original master wheel. The worm can be disengaged, so that the work spindle may be revolved by hand, to test the blank. A micrometer dial, reading in degrees, facilitates rolling the blank, in cutting bevel gears. The worm is conveniently adjustable for wear.

Work spindle is of steel, of large diameter, and is provided with No. 10 B. & S. taper hole, for receiving various work arbors. A draw-in bolt is provided, to draw in and lock out the work arbors, positively, without hammering. A live center, with dog driver, is furnished for holding work upon centers, in connection with the outside support. This permits of cutting gears upon ordinary or lathe mandrels, cutting solid pinions, fluting taps, reamers, and all such other work which must be done on centers.

Work head is raised and lowered by means of a screw, with ball-thrust bearings. A dial, graduated to read to thousandths of an inch, is used in setting the proper depth to be cut.

Description continued on following page.

20" SEMI-AUTOMATIC GEAR CUTTING MACHINE.

DESCRIPTION FIG. 11449.—Continued.

Outside support for work arbor, being supported from the work head, is raised and lowered with it, thus being always in line with the work spindle. It is adjustable for different classes of work, and is easily removable.

Rim support is also provided, to take the strain of the cut.

Cutter spindle is provided with four changes of speed, by means of the cone pulley countershaft on the base of the machine. The cutter-spindle pulley runs upon its own bearing, thus relieving the spindle of all strain of the belt. The countershaft loose pulley runs upon a cast iron bush, thus avoiding any liability of the machine starting accidentally, as is the case when the loose pulley runs on the shaft itself. Both bolts are endless, means being provided for adjusting and maintaining the proper belt tension.

Cutter slide can be adjusted, for cutting bevel gears, to an angle of 90°, by means of a graduated quadrant. The lower slide is independently adjustable, in and out, to accommodate various lengths of hubs. A micrometer dial indicates the side adjustment of the cutter, in cutting bevel gears.

Positive geared power feed has six changes, obtained by means of change gears, giving feeds evenly graded from .018" to .150" per revolution of the cutter spindle. Feed is automatically released by an adjustable stop.

Conveniences.—The machine is entirely self-contained, being driven by one belt direct from the line shaft, or by constant speed motor. All working parts and gears are guarded and protected from dust. A removable chip box catches the chips directly from the cutter. The base of the machine is formed to serve as a pan, to keep the floor free from oil and chips.

Workmanship is of the highest class. All bearings are amply proportioned and accurately fitted. The material used is of the best quality.

Adjustments are provided where necessary, and are conveniently located.

Each machine is carefully inspected and actually operated before shipment.

HAND FEED GEAR CUTTING MACHINE.



FIG. 11450.

DESCRIPTION FIG. 11450.

This is a low-priced, practical and efficient machine, capable of cutting spur, bevel and worm gears up to 30" diameter; 6 $\frac{1}{4}$ " face, 6 diametral pitch in cast iron.

A similar machine is also built in the semi-automatic type. It has the same capacity as the hand feed gear cutter, but will cut as coarse as 5 diametral pitch in cast iron.

NO. 1 AUTOMATIC GEAR CUTTING MACHINE.

DESCRIPTION FIGS. 11451
AND 11452.

This machine will cut spur and bevel gears, and worm gears (by the hobbing process) from blanks not previously nicked.

Every movement is positive and depends on the completion of all previous movements. There are no frictional devices; only one driving belt and one stop adjustment for the length of stroke and release of indexing device.

The traversing screws have graduated dials. A gauge is provided for setting the cutter on the cutter. The range of feeds is wide and feed may be thrown in or out at any time. Graduated stops provide micrometer adjustments for setting over the cutter in bevel gear cutting. Similar graduated adjustments are also provided for setting over the blank.

The machine will divide for all numbers from 4 to 100, all even numbers to 200, and many of the higher numbers.



FIG. 11451. REAR VIEW.



FIG. 11452. FRONT VIEW.

The machine can be furnished with reversible feed (whereby bevel gears may be cut either toward or away from the apex); also with speed gears for brass work, power hobbing feed, and horizontal centers, vertical spindle, internal gear cutting and rack cutting attachments, and oil pump.

All of these are attachments at extra prices.

SPECIFICATIONS.

Diameter of gears cut.....	34"
Face of gears cut.....	7"
Diametral pitch.....	6
Size hole in cutter.....	3/8"
Countershaft pulleys.....	10" x 3"
Speed of countershaft, revolutions per minute.....	280
Machine pulley.....	11" x 2 3/4"
Speeds of machine pulley, revolutions per minute.....	190, 280 and 430
Floor space.....	30" x 59"
Net weight.....	2,400 lbs.
Domestic shipment.....	2,700 lbs.
Foreign shipment, 63" x 62" x 30".....	2,750 lbs.



FIG. 11453.

NO. 2 AUTOMATIC GEAR CUTTING MACHINE.

DESCRIPTION FIG. 11454.

The No. 2 machine will cut spur gears and will finish worm gears by the hobbing process from blanks not previously nicked. It is similar to the No. 1 machine, page 233, except that there is no provision for setting over the cutter head at an angle to the axis of the blank.

SPECIFICATIONS.

Diameter of gears cut.....	36"
Face of gears cut.....	9½"
Diametral pitch.....	5
Size of hole in cutter.....	⅜"
Countershaft pulleys.....	10" x 3"
Speed of countershaft, revolutions per minute.....	280
Machine pulley.....	11" x 2¼"
Speeds of machine pulley, revolu-	



NEW TYPE GEAR CUTTERS.

FOR SPUR GEARS ONLY.



FIG. 11455.

DESCRIPTION FIGS. 11455 AND 11456.

The new type line of machines is designed for cutting spur gears only. These machines are entirely automatic in operation. Every movement is complete in itself and cannot take place unless all previous movements are fully and correctly completed.

Only one belt is used to drive the entire machine.

Cutter spindle has powerful drive and is of extra large diameter; it has long, heavy bearings at both ends.

Cutter carriage has long, flat-bearing surfaces, with a perfect clamp on ways, preventing upward spring. Cutter carriage has our improved screw feed.

The improved positive dividing mechanism is the most perfect ever attained. It compensates for all wear and play in change wheels and intermediate parts. Worm wheel is made in two sections and is positively correct.

Automatic oil pump and pan are furnished—no oil-waked floors.

Outside support to work mandrel can be moved longitudinally and can be used for supporting either long or short mandrels. It can be brought close up to the work, and makes a very rigid support.

Cutter speeds and feeds are obtained by simply changing two gears which can be slipped on and off the shaft without the use of wrench, nut or screw. No changing of cumbersome belts on cones, etc.

Change gears are furnished for all numbers of teeth from 10 to 100, and all from 100 to 400, excepting prime numbers and their multiples; and a vast range of higher numbers. Others do about 60 per cent. less than this.

Bearings are of phosphor bronze, and all sliding surfaces are scraped to standard surface plates. Workmanship throughout is of the highest standard.

We make gear-cutting machines in fourteen styles and sizes, with direct-connected electric motor drive, when desired, meeting every requirement in the gear-cutting line.

For specifications, see following page.

NEW TYPE GEAR CUTTERS.

FOR SPUR GEARS ONLY.

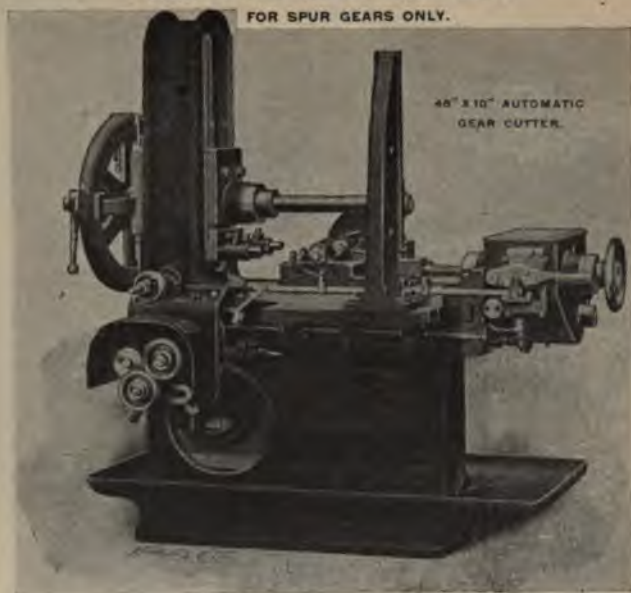


FIG. 11456.

SPECIFICATIONS FIGS. 11455 AND 11456.

	20" x 8" Special Steel Piston Cutter.	30" x 9" New Type.	48" x 10" New Type.	60" x 12" New Type.	64" x 20" Special Steel Motor Gear Cutter.	72" x 14" New Type.	84" x 16" New Type.
Diameter and face.....	20" x 8"	30" x 9"	48" x 10"	60" x 12"	64" x 20"	72" x 14"	84" x 16"
Will cut minimum diameter....	2½"	0"	0"	0"	4"	2"	4"
Diametral pitch in cast iron.....	2	4	3	2	1½	1½	1½
Diametral pitch in steel.....	3	5	4	3	1½	2	1½
Diameter of cutter spindle.....	1½"	1½"	1½"	1½"	1½" and 2"	1½" and 1½"	1½"
Weight, about.....	5,400 lbs.	2,700 lbs.	3,750 lbs.	6,300 lbs.	12,300 lbs.	9,200 lbs.	13,500 lbs.
Counter pulleys.....	14" x 4½"	12" x 3¼"	12" x 3¼"	14" x 4½"	16" x 6"	16" x 6"	16" x 6"
Revolutions for counter pulleys..	275	250	250	275	400	300	325

We furnish, at extra cost, worm hobbing, automatic rack cutting, automatic rim clamp, hand rim clamp, wood cutting and internal gear cutting attachments.

In addition to machines shown in Figs. 11455 and 11456, we are prepared to furnish two sizes of large full automatic gear cutters for cutting spur gears only. These large machines are of the horizontal type and differ materially from those described above. Specifications as follows:

Diameter and face.....	120" x 20"	180" x 24"
Will cut minimum diameter.....	5"	6"
Circular pitch, in cast iron.....	4½"	6"
Circular pitch, in steel.....	3"	4½"
Diameter of cutter spindle.....	2" and 3"	2" and 3"
Weight, about.....	27,000 lbs.	40,000 lbs.
Counter pulleys.....	24" x 6½"	28" x 8½"
Revolutions for counter pulleys.....	300	300

Photographs and complete description sent on application.

REGULAR STYLE GEAR CUTTERS.

FOR SPUR, BEVEL, SKEW AND FACE GEARS.



36" x 6"
AUTOMATIC
GEAR
CUTTER.

FIG. 11457.

DESCRIPTION FIG. 11457

Our regular style automatic gear cutting machines have been redesigned, and are now made from entirely new patterns. The principal change has been made in the method of driving, only one belt, direct to machine, being now employed to drive the entire machine. Bearings and wearing parts are large and generous in proportions, and as now constructed these machines are considered the acme of perfection in this class of machinery.

They can be set by any person of ordinary mechanical knowledge, as they have less complicated parts than any other gear cutting machines made.

Worm wheel and worm have V shaped teeth, which we have found to give the best results. We have machines in our works which have been in use for about forty years, the worm and worm wheel of which are now as true as when made.

Worm dividing wheel is large. It is made in sections and undergoes a process which positively insures accuracy. We warrant it to be correct.

Index and change gears are provided for cutting all numbers from 10 up to 100, all but prime numbers and their multiples from 100 to 450 and a vast range of higher numbers.

This machine is arranged so that cutter carriage cannot feed forward, unless the divisions have been fully completed.

The support of overhanging arm to hold the outer end of the work mandrel is a desirable feature in cutting solid pinions, or using long mandrels. When work larger than will swing under the arm is required to be cut, the overhanging arm is to be removed, and the arm is so arranged that this can be done expeditiously and replaced when required.

To take the strain of the cutter, in cutting large gears, an adjustable rim brace is furnished.

For cutting bevel, miter or face gearing they have graduated slide and quadrant for setting the slide at any angle from 0 to 90°. The machines have also a quick adjustment to cutter spindle.

SPECIFICATIONS.

	12" x 5" Hand Feed Machines*	22" x 5" Regular Style.	36" x 6" Regular Style.	50" x 8" Regular Style.	62" x 10" Regular Style.	74" x 14" Regular Style.
Diameter and face.....	12" x 5"	22" x 5"	36" x 6"	50" x 8"	62" x 10"	74" x 14"
Diametral pitch, in cast iron.....	12	6	3	2½	2	1½
Diametral pitch, in steel.....	14	8	4	3	2½	1½
Diameter of cutter arbor.....	5/8"	1¼"	1½"	1¾"	2¼"	1½"
Weight, about.....	560 lbs.	1,500 lbs.	3,650 lbs.	5,200 lbs.	8,500 lbs.	12,300 lbs.
Counter pulleys.....	7" x 2¼"	10" x 3"	12" x 3"	12" x 3"	16" x 5"	16" x 6"
Revolutions for counter pulleys.....	125	200	175	200	200	200
Overhanging support will swing gear in diameter.....	8½"	12"	20½"	29"	40"	40"

*The 12" x 5" machine is not full automatic and is designed for cutting spur and bevel gears only.

NO. 2 FULL AUTOMATIC GEAR CUTTER.



FIG. 11456.

DESCRIPTION FIG. 11456.

This machine was designed to meet the requirements of an automatic machine, to cut the large quantity of light and medium class of spur and bevel gears. Spur gears are cut entirely automatic; bevel and miter gears, where it is desired to take two cuts, are cut automatically, except the necessary resetting, between the two cuts.

The machine will cut 24" diameter; 17" diameter under the outside support; 6" face; and will cut 8 diametral pitch in steel, and 6 diametral pitch in cast iron, from the solid. Coarser pitches can be cut, by taking stocking cuts.

Work spindle is of steel, of large diameter, and is provided with B. & S. No. 10 taper hole, for receiving the various work arbors. A draw-in bolt is provided, for drawing in and forcing out, positively, without hammering, the work arbors. A live center and dog driver are furnished for holding work on ordinary or lathe mandrels, on centers, in connection with the outside support. This permits of cutting solid gears, fluting reamers, taps, etc., and all such work which must be done on centers.

Index wheel is of large diameter. It is made in sections, and is hobbed in place, by a method which insures the highest accuracy in the divisions. The index wheel on each machine is an original master wheel.

Work head is raised and lowered by means of a screw, with ball thrust bearings. A dial graduated to read to thousandths of an inch is used in setting the depth to be cut.

NO. 2 FULL AUTOMATIC GEAR CUTTER.

DESCRIPTION FIG. 11488.—Continued.

Outside support for work arbor, being supported from the work head, is raised and lowered with it, thus being always in line with the work spindle. It is adjustable for different classes of work and is easily removable.

Rim support for large gears is also provided, to take the direct strain of the cut.

Cutter spindle is provided to take cutters with the hole both $\frac{1}{4}$ " and $\frac{1}{8}$ ".

Cutter slide can be adjusted, by means of a graduated quadrant, and worm adjustment, to the angle of 90°, for cutting bevel or miter gears. The lower slide is independently adjustable, in and out from the column, to accommodate the various lengths of hubs. A micrometer dial indicates the side adjustment of the cutter, in cutting bevel or miter gears.

Positive geared power feed is provided with change gears, giving a wide range of feed. The feed and cutter drives are independent of each other, allowing one to be changed without affecting the other. This allows the feed to be determined at a certain rate per minute, independently of the cutter speeds.

Quick return to the cutter slide is driven independently of the feed, and is thus constant.

All the movements are arranged conveniently and safely. The automatic feed can be instantly disengaged at any time.

The machine is self-contained, being driven by one belt direct from the line shaft, or by constant speed motor. All working parts and gears are guarded and protected from dust. The chips are conveniently removed. The base of the machine is formed as a pan, to keep the floor free from oil and chips.

Oil pumps and fittings are very desirable, where it is required to cut steel gears in large quantities.

Workmanship is of the highest class. Bearings are accurately fitted and amply proportioned. Material is of best quality. Convenient adjustments are provided where necessary.

Weight, 1,300 lbs.

30' GEAR CUTTING MACHINE.

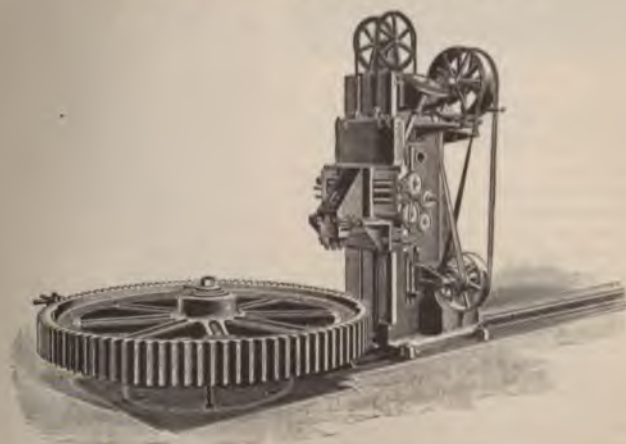


FIG. 11489.

DESCRIPTION FIG. 11489.

This is a special machine of which details will be sent on application.

VERTICAL BORING AND TURNING MILLS.

34" BORING MILL.



FIG. 11460.

position, or by placing the feed reverse lever in central position. Feeds range from $.012''$ to $.125''$ in vertical or angular directions, and $.025''$ to $.250''$ in horizontal directions.

The chuck is 30" in diameter, of extra heavy design and all parts are very strong. The scroll is made from a steel forging, and the chuck is both universal and independent. The jaws are fitted in T slots, planed in supplementary steel slides which can be adjusted separately by an independent screw underneath. This screw takes its bearing in a shorter slide which engages the scroll, and by means of which the entire jaw is moved forward or backward when used universally. If it is desired to move the gripping jaws quickly, they may be loosened from the slide and set in any position. To prevent any possibility of the jaws slipping, when under extreme pressure, interlocking teeth are milled in both jaw and slide. Either 3 or 4 jaw chuck or plain table can be furnished as preferred. Both chuck and table provided with heavy T slots for the use of strapping bolts.

The driving cone shaft is placed parallel with the cross rail and the machine may be located under a traveling crane and belted back to the countershaft, leaving a clear space overhead for crane service.

The main drive.—The main driving gear has spur teeth, is made of semi-steel and is bolted to the lower part of the chuck or table, so

DESCRIPTION FIGS. 11460 TO 11464.

The capacity of this mill is 35" in diameter, will take 10" with chuck and 17" with table under cross rail and 25" under the turret. It has sixteen changes of speed, varying from 25% to 68% revolutions per minute.

The feeds are positive, gear driven, both vertical and horizontal, and provided with adjustable automatic stops. The feed changes are affected by means of two levers, thus: The multiplying lever is placed at spring pin hole marked *SLOW*, and the feed change lever immediately below covers a range of four changes which can be repeated with multiplying lever at spring pin hole marked *FAST*; making eight available changes of feed for each speed of table or chuck. The entire feed mechanism may be stopped, started, or reversed by means of a hand lever at base of the machine. It is possible to stop the feed at five different points, viz: By using the trip lever; by withdrawing the slip pinion on feed screw, or feed shaft; by dropping out the feed change lever; by placing multiplying lever in central

34" BORING MILL.

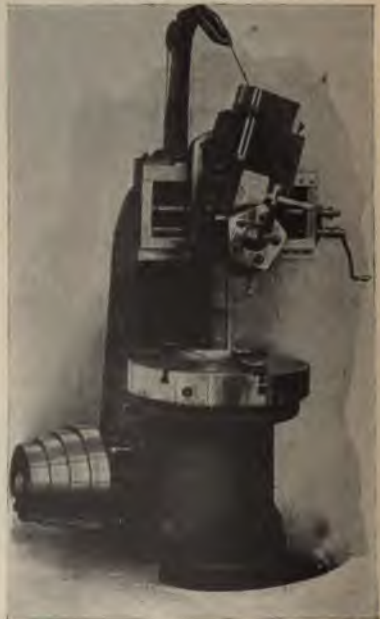


FIG. 11461.

VERTICAL BORING AND TURNING MILLS.

HEAD AND RAIL OF 34" MILL.



FIG. 11462.

DESCRIPTION FIGS. 11460 TO 11464.—Continued.

that there is no twisting strain on the spindle. It is driven by a steel pinion through a powerful train of gears. The ratio of the constant train is $7\frac{1}{2}$ to 1, and the ratio of back gears is 45 to 1. There are sixteen changes of speed, graded to give a perfect geometrical progression.

REAR VIEW 34" BORING MILL.



FIG. 11463.

The table spindle is 6" in diameter and has a large phosphor bronze conical bearing at the top, making it self-centering, and its own weight as well as that of the table and lead has a tendency to maintain its alignment. The table spindle extends downward nearly to the floor and has two large vertical bearings to resist side strains. An adjustable collar on the lower end of the spindle keeps the table from lifting when taking under cuts.

The vertical turret slide has a travel of 20" either by hand or power, and is carried on a swivel saddle attached to the cross slide by a central stud. The saddle is clamped to the cross slide by four bolts, working in a circular T slot. When the power feed is used, an adjustable automatic stop regulates the length of travel as desired. A graduated scale 24" long is attached to the turret slide cap, parallel with the turret slide. The latter has an adjustable pointer which moves over the scale, indicating at all times the travel of the turret slide. A counterbalance weight suspended within the column and connected to the turret slide makes it easy running. The turret slide can be swiveled to any angle up to 30° either side of the perpendicular. This operation is unique and is accomplished by simply turning the crank on the vertical feed shaft, first having locked the weight cable by means of the clamp on the sheave wheel bracket on top of the machine, and loosening the clamping bolts on the swivel.

VERTICAL BORING AND TURNING MILLS.

THREAD CUTTING ATTACHMENT, SIDE VIEW.

DESCRIPTION FIGS. 11460 TO 11464.

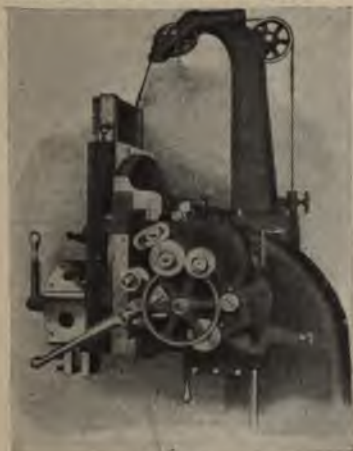


FIG. 11464.

The thread cutting attachment will cut from 4 to 14 including 11½ threads per inch. It is quickly applied and can remain permanently attached to the machine without interfering with its regular operation. It consists of an arm having a fixed stud forming a bearing for change gears. This is attached to the side of the feed gear case, so as to bring the change gear in mesh with the proper gear in the train.

A special index plate is placed in plain sight of the operator.

Thread cutting is very simple, and is as follows: The table should be running in one direction and it is not necessary to stop or reverse same when cutting threads. Raise slide to required height, set pointer on scale to an even inch. Multiplying lever on back of feed case should stand in vertical position.

Throw multiplying lever over to point marked *FAST* and take first cut. When the cut has run down to the required depth, throw multiplying lever back to central position. Withdraw tool and return to starting point indicated by pointer on scale. Set tool in for required depth for next cut, then throw multiplying lever to *FAST*, and proceed as before until the thread is finished.

The micrometer dial on cross feed screw permits a fine adjustment for depth of cut.

An adjustable stop regulates the final depth of cut for both inside and outside thread cutting.

SPECIFICATIONS.

Swing.....	35"
Maximum distance under cross rail with table.....	17"
Maximum distance under cross rail with chuck.....	16"
Maximum distance under turret with table.....	25"
Maximum distance under turret with chuck.....	24"
Vertical travel of turret slide.....	20"
Horizontal travel of turret slide.....	18"
Diameter of turret.....	10"
Diameter of holes in turret.....	2½"
Largest diameter of cone.....	18"
Smallest diameter of cone.....	12½"
Width of belt on cone.....	3"
Diameter of countershaft pulleys.....	14" and 20"
Width of belt for countershaft pulleys.....	4"
Floor space over all.....	4' 6" by 5' 1"
Weight of machine, net.....	5,200 lbs.
Weight of machine, crated.....	5,500 lbs.
Weight of machine boxed for export.....	6,000 lbs.
Boxed for export, 1 case (7' 5" by 4' 10" by 5' 5") cubic contents.....	195 cubic feet

VERTICAL BORING AND TURNING MILLS.

42" MILL WITH TWO PLAIN SWIVEL HEADS AND THREE JAW CHUCK TABLE.

DESCRIPTION FIGS. 11465 TO 11467.

The capacity of this mill is 43" in diameter, takes $32\frac{1}{2}$ " under the cross rail with chuck, or 33" with plain table, and $36\frac{1}{2}$ " under the turret with chuck, or 37" with plain table. It is a stiff, powerful tool, built for high-speed duty and capable of handling any job within its range in the best possible manner. Furnished with one fixed turret head and one plain swivel head, as shown in Fig. 11466, or with two plain swivel heads, as illustrated on this page.

The table is 37" in diameter and is driven by a large steel spur pinion. It has ten changes of speed in correct geometrical progression, varying from 3 to 61 revolutions per minute.

A combination chuck or plain table may be furnished, as desired. Interlocking teeth arc milled in both jaw and slide of chuck to prevent any possibility of the jaws slipping when under extreme pressure. Both chuck and table are provided with T slots for the use of clamping bolts.

The table spindle has a large angular bearing at the top, and two straight vertical bearings. The angular bearing makes it self-centering, and its own weight, as well as that of the table and load, has a tendency to maintain its perfect alignment. A special automatic lubricating device is provided, and the spindle always rides on a thin film of oil.

The plain swivel heads, both right and left, are entirely independent in their movements, both as to direction and amount of feed, and are operated from separate feed cases. They may be set at any angle up to 45° , and have a vertical or angular travel of 22° . Both heads may be brought to the center for boring, the exact position being determined by a positive center stop. The tool holders are made from the best steel forgings; their shanks are $2\frac{3}{4}$ " in diameter and have a vertical adjustment of 4" in the ram.

The right hand turret head is of very heavy design. The turret is five-sided, with $2\frac{3}{4}$ " holes for shank of forged steel tool holders. Each side is drilled and tapped for four $\frac{5}{8}$ " screws for clamping special tools to turret. The turret is inclined at an angle, giving much greater depth to the turret slide, and consequently more strength and rigidity than is possible with the old style straight turret. The vertical travel of the turret slide is 23° . The turret head does not swivel.

The cross rail is $72\frac{1}{2}$ " long, of the box girder type, the back strongly arched between housings, and extremely rigid. It is raised and lowered by power by means of worm and worm wheel, which run in oil in dust-proof cases mounted on top of housings.

Feeds are positive gear driven, have ten changes, ranging from .030" to .700" horizontally, and from .015" to .350" in vertical or angular directions.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together

Head Stock.—All the driving mechanism for the main spindle is self-contained in a separate head stock, which is secured to the bed between the housings. The gears run in a bath of oil and are thoroughly protected by suitable dust-proof guards. If necessary, the entire head stock may be quickly removed from the machine, and easily replaced as it is doweled in position.



FIG. 11465.

VERTICAL BORING AND TURNING MILLS.

THREAD CUTTING ATTACHMENT. SIDE VIEW.

DESCRIPTION FIGS. 11460 TO 11464.

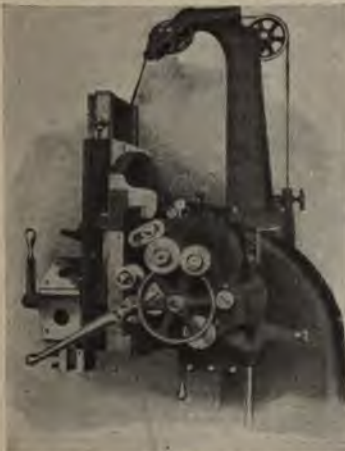


FIG. 11464.

The thread cutting attachment will cut from 4 to 14 including $11\frac{1}{2}$ threads per inch. It is quickly applied and can remain permanently attached to the machine without interfering with its regular operation. It consists of an arm having a fixed stud forming a bearing for change gears. This is attached to the side of the feed gear case, so as to bring the change gear in mesh with the proper gear in the train.

A special index plate is placed in plain sight of the operator.

Thread cutting is very simple, and is as follows: The table should be running in one direction and it is not necessary to stop or reverse same when cutting threads. Raise slide to required height, set pointer on scale to an even inch. Multiplying lever on back of feed case should stand in vertical position.

Throw multiplying lever over to point marked *FAST* and take first cut. When the cut has run down to the required depth, throw multiplying lever back to central position. Withdraw tool and return to starting point indicated by pointer on scale. Set tool in for required depth for next cut, then throw multiplying lever to *FAST*, and proceed as before until the thread is finished.

The micrometer dial on cross feed screw permits a fine adjustment for depth of cut.

An adjustable stop regulates the final depth of cut for both inside and outside thread cutting.

SPECIFICATIONS.

Swing.....	35"
Maximum distance under cross rail with table.....	17"
Maximum distance under cross rail with chuck.....	16"
Maximum distance under turret with table.....	25"
Maximum distance under turret with chuck.....	24"
Vertical travel of turret slide.....	30"
Horizontal travel of turret slide.....	18"
Diameter of turret.....	10"
Diameter of holes in turret.....	2 $\frac{1}{4}$ "
Largest diameter of cone.....	18"
Smallest diameter of cone.....	12 $\frac{3}{4}$ "
Width of belt on cone.....	3"
Diameter of countershaft pulleys.....	14" and 20"
Width of belt for countershaft pulleys.....	4"
Floor space over all.....	4' 6" by 5' 1"
Weight of machine, net.....	5,200 lbs.
Weight of machine, crated.....	5,800 lbs.
Weight of machine boxed for export.....	6,000 lbs.
Boxed for export, 1 case (7' 5" by 4' 10" by 5' 5") cubic contents.....	195 cubic feet

VERTICAL BORING AND TURNING MILLS.

42" MILL WITH TWO PLAIN SWIVEL HEADS AND THREE JAW CHUCK TABLE.

DESCRIPTION FIGS. 11465 TO 11467.

The capacity of this mill is 42" in diameter, takes $32\frac{1}{2}$ " under the cross rail with chuck, or 33" with plain table, and $36\frac{1}{2}$ " under the turret with chuck, or 37" with plain table. It is a stiff, powerful tool, built for high-speed duty and capable of handling any job within its range in the best possible manner. Furnished with one fixed turret head and one plain swivel head, as shown in Fig. 11466, or with two plain swivel heads, as illustrated on this page.

The table is 37" in diameter and is driven by a large steel spur pinion. It has ten changes of speed in correct geometrical progression, varying from 3 to 61 revolutions per minute.

A combination chuck or plain table may be furnished, as desired. Interlocking teeth are milled in both jaw and slide of chuck to prevent any possibility of the jaws slipping when under extreme pressure. Both chuck and table are provided with T slots for the use of clamping bolts.

The table spindle has a large angular bearing at the top, and two straight vertical bearings. The angular bearing makes it self-centering, and its own weight, as well as that of the table and load, has a tendency to maintain its perfect alignment. A special automatic lubricating device is provided, and the spindle always rides on a thin film of oil.

The plain swivel heads, both right and left, are entirely independent in their movements, both as to direction and amount of feed, and are operated from separate feed cases. They may be set at any angle up to 45° , and have a vertical or angular travel of 22° . Both heads may be brought to the center for boring, the exact position being determined by a positive center stop. The tool holders are made from the best steel forgings; their shanks are $2\frac{3}{4}$ " in diameter and have a vertical adjustment of 4° in the ram.

The right hand turret head is of very heavy design. The turret is five-sided, with $2\frac{1}{4}$ " holes for shank of forged steel tool holders. Each side is drilled and tapped for four $\frac{5}{16}$ " screws for clamping special tools to turret. The turret is inclined at an angle, giving much greater depth to the turret slide, and consequently more strength and rigidity than is possible with the old style straight turret. The vertical travel of the turret slide is 23° . The turret head does not swivel.

The cross rail is $72\frac{1}{2}$ " long, of the box girder type, the back strongly arched between housings, and extremely rigid. It is raised and lowered by power by means of worm and worm wheel, which run in oil in dust-proof cases mounted on top of housings.

Feeds are positive gear driven, have ten changes, ranging from .030" to .700" horizontally, and from 0.15° to 350° in vertical or angular directions.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together.

Head Stock.—All the driving mechanism for the main spindle is self-contained in a separate head stock, which is secured to the bed between the housings. The gears run in a bath of oil and are thoroughly protected by suitable dust-proof guards. If necessary, the entire head stock may be quickly removed from the machine, and easily replaced as it is dovetailed in position.



FIG. 11465.

VERTICAL BORING AND TURNING MILLS.

THREAD CUTTING ATTACHMENT. SIDE VIEW.



FIG. 11464.

DESCRIPTION FIGS. 11460 TO 11464.

The thread cutting attachment will cut from 4 to 14 including $1\frac{1}{2}$ threads per inch. It is quickly applied and can remain permanently attached to the machine without interfering with its regular operation. It consists of an arm having a fixed stud forming a bearing for change gears. This is attached to the side of the feed gear case, so as to bring the change gear in mesh with the proper gear in the train.

A special index plate is placed in plain sight of the operator.

Thread cutting is very simple, and is as follows: The table should be running in one direction and it is not necessary to stop or reverse same when cutting threads. Raise slide to required height, set pointer on scale to an even inch. Multiplying lever on back of feed case should stand in vertical position.

Throw multiplying lever over to point marked *FAST* and take first cut. When the cut has run down to the required depth, throw multiplying lever back to central position. Withdraw tool and return to starting point indicated by pointer on scale. Set tool in for required depth for next cut, then throw multiplying lever to *FAST*, and proceed as before until the thread is finished.

The micrometer dial on cross feed screw permits a fine adjustment for depth of cut.

An adjustable stop regulates the final depth of cut for both inside and outside thread cutting.

SPECIFICATIONS.

Swing.....	35"
Maximum distance under cross rail with table.....	17"
Maximum distance under cross rail with chuck.....	16"
Maximum distance under turret with table.....	25"
Maximum distance under turret with chuck.....	24"
Vertical travel of turret slide.....	20"
Horizontal travel of turret slide.....	18"
Diameter of turret.....	10"
Diameter of holes in turret.....	2 $\frac{1}{4}$ "
Largest diameter of cone.....	18"
Smallest diameter of cone.....	12 $\frac{1}{2}$ "
Width of belt on cone.....	3"
Diameter of countershaft pulleys.....	14" and 20"
Width of belt for countershaft pulleys.....	4"
Floor space over all.....	4' 6" by 5' 1"
Weight of machine, net.....	5,200 lbs.
Weight of machine, crated.....	5,500 lbs.
Weight of machine boxed for export.....	6,000 lbs.
Boxed for export, 1 case (7' 5" by 4' 10" by 3' 5"), cubic contents.....	105 cubic feet

VERTICAL BORING AND TURNING MILLS.

42" MILL WITH TWO PLAIN SWIVEL HEADS AND THREE JAW CHUCK TABLE.

DESCRIPTION FIGS. 11465 TO 11467.

The capacity of this mill is 43" in diameter, takes 32½" under the cross rail with chuck, or 33" with plain table, and 36½" under the turret with chuck, or 37" with plain table. It is a stiff, powerful tool, built for high-speed duty and capable of handling any job within its range in the best possible manner. Furnished with one fixed turret head and one plain swivel head, as shown in Fig. 11466, or with two plain swivel heads, as illustrated on this page.

The table is 37" in diameter and is driven by a large steel spur pinion. It has ten changes of speed in correct geometrical progression, varying from 3 to 61 revolutions per minute.

A combination chuck or plain table may be furnished, as desired. Interlocking teeth are milled in both jaw and slide of chuck to prevent any possibility of the jaws slipping when under extreme pressure. Both chuck and table are provided with T slots for the use of clamping bolts.

The table spindle has a large angular bearing at the top, and two straight vertical bearings. The angular bearing makes it self-centering, and its own weight, as well as that of the table and load, has a tendency to maintain its perfect alignment. A special automatic lubricating device is provided, and the spindle always rides on a thin film of oil.

The plain swivel heads, both right and left, are entirely independent in their movements, both as to direction and amount of feed, and are operated from separate feed cases. They may be set at any angle up to 45°, and have a vertical or angular travel of 22°. Both heads may be brought to the center for boring, the exact position being determined by a positive center stop. The tool holders are made from the best steel forgings; their shanks are 2½" in diameter and have a vertical adjustment of 4" in the ram.

The right hand turret head is of very heavy design. The turret is five-sided, with 2¼" holes for shank of forged steel tool holders. Each side is drilled and tapped for four ½" screws for clamping special tools to turret. The turret is inclined at an angle, giving much greater depth to the turret slide, and consequently more strength and rigidity than is possible with the old style straight turret. The vertical travel of the turret slide is 23". The turret head does not swivel.

The cross rail is 72½" long, of the box girder type, the back strongly arched between housings, and extremely rigid. It is raised and lowered by power by means of worm and worm wheel, which run in oil in dust-proof cases mounted on top of housings.

Feeds are positive gear driven, have ten changes, ranging from .039" to .700" horizontally, and from .015" to .350" in vertical or angular directions.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together.

Head Stock.—All the driving mechanism for the main spindle is self-contained in a separate head steel, which is secured to the bed between the housings. The gears run in a bath of oil and are thoroughly protected by suitable dust-proof guards. If necessary, the entire head stock may be quickly removed from the machine, and easily replaced as it is doweled in position.



FIG. 11465.

VERTICAL BORING AND TURNING MILLS.



FIG. 11466.

Countershaft is mounted on the housings of mill and carries tight and loose pulleys 16" in diameter for 5" belt. The driving belt may be shifted from either side of the machine. A five-step cone is arranged for 3" double belt. Speed of countershaft should be 424 revolutions per minute.

A belt shifter is provided for mechanically shifting belt from one step of the cone pulley to another. Practically no effort is required to operate it, and changes may be quickly made, enabling the operator to run his machine at the proper speed for his work at all times.

Floor space is reduced to the minimum on account of the compact design. Actual space required being 97" by 71".

Weight.—Net, 11,000 lbs. Crated, 11,300 lbs. Boxed for export, 12,500 lbs. Occupies for export, 270 cubic feet.

SPECIFICATIONS.

Swing.....	43"
Maximum distance under cross rail.....	33"
Maximum distance under turret.....	37"
Length of cross rail.....	72½"
Table diameter.....	37"
Travel of rams.....	22"
Diameter of tool-holder shanks in plain head.....	2½"
Diameter of tool-holder shanks in turret head.....	2¼"
Largest diameter of cone pulley.....	18"
Smallest diameter of cone pulley.....	9¼"

42" MILL, ONE PLAIN SWIVEL HEAD, ONE
FIXED TURRET HEAD AND THREE-
JAW CHUCK TABLE.

DESCRIPTION FIGS. 11466 TO 11497.—
Continued.

This mill is provided with friction brake, which is operated by a treadle placed within easy reach of operator at the front of machine. Acting directly upon the prime mover, all shock and jar is eliminated and the table brought to a dead stop instantly in any desired position.

All gears are thoroughly protected by guards.

This machine can be driven by either a constant or variable speed motor without changing the construction, and motor may be attached at any time.

Bronze bushings are furnished for all high-speed journals.

Proper and convenient means for lubrication is given special attention.

Thread-cutting attachment for cutting all standard threads from 4 to 14 per inch, including 11½, can be attached to righthand head. Furnished only when specially ordered, but may be attached at any time.

42" MILL, REAR VIEW.

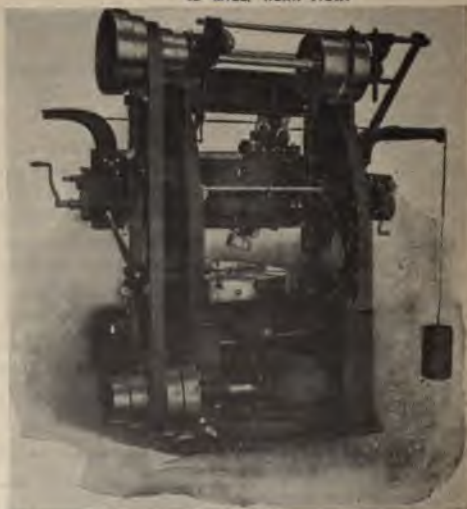


FIG. 11467.

VERTICAL BORING AND TURNING MILLS.

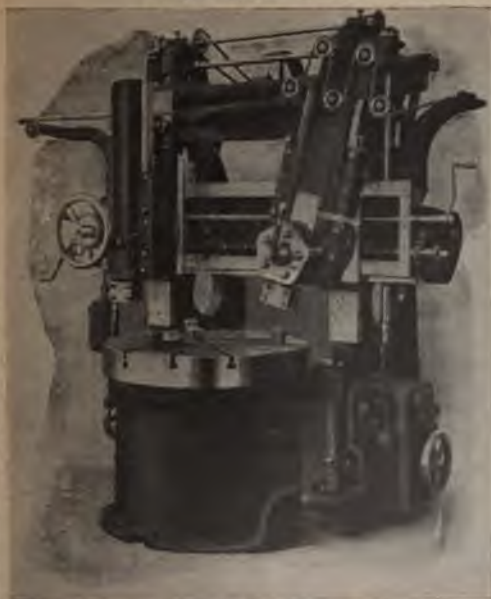


FIG. 11468.

48" MILL WITH ONE SWIVEL TURRET HEAD, ONE PLAIN SWIVEL HEAD AND THREE JAW CHUCK TABLE.

DESCRIPTION FIGS. 11468 AND 11469.

The capacity of this mill is 48" in diameter, takes 34" under the cross rail and 40" under the turret. It is a rugged, powerful tool, built to withstand the heaviest cuts with high speed steel. Furnished with one swivel turret head and one plain swivel head, as shown in cut on this page, or with two plain swivel heads, as illustrated on the following page.

The table is 40" in diameter and is driven by spur gearing. It has eight changes of speed in correct geometrical progression, varying from $2\frac{1}{2}$ to 52 revolutions per minute.

A universal chuck or plain table may be furnished. Interlocking teeth are milled in both jaw and slide of chuck to prevent any possibility of the jaws slipping when under extreme pressure. Both chuck and table are provided with T slots for the use of clamping bolts.

The spindle has a large angular bearing at the top and two straight vertical bearings. The angular bearing makes it self-centering, and its own weight as well as that of the table and load, has a tendency to maintain its perfect alignment.

The heads, both right and left, are entirely independent in their movements, both as to direction and amount of feed, and are operated from separate feed cases. They can be set at any angle, and have a vertical or angular travel of 28". Both heads can be brought to the center for boring, the exact position being determined by a positive center stop. The tool holders are made from the best steel forgings; their shanks are 3" in diameter and have an adjustment of 4".

The right hand turret head is of extremely heavy design. The turret slide has a vertical travel of 24". The turret is five sided, with $2\frac{1}{4}$ " holes for shank of forged steel tool holders. Each side is drilled and tapped for four $\frac{5}{8}$ " screws for clamping special tools to turret. A plain swivel head, same as left hand head, can be furnished in place of the turret head, if desired.

Power rapid traverse is furnished regularly on all 48" mills with turret heads and on mills with two regular swivel heads when specially ordered. This device allows the heads to be operated quickly in all directions and when in use the regular feeds are automatically disengaged.

Cross rail 8' 0" long, of massive construction, raised or lowered by power

Feeds are positive gear driven, have ten changes, ranging from .025" to .500" horizontally, and from .018" to .364" in vertical or angular directions.

Cons pulleys do not overhang, but are carried on heavy shafts and supported by bearings on each side, thus eliminating any tendency for the bearings to wear out of true, caused by the pull of the belt.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together

Main drive.—All the driving mechanism for the main spindle is self-contained in a separate head stock, which is secured to the bed between the housings. The gears are thoroughly protected by suitable dust guards. If necessary, the entire drive can be removed from the machine in a few minutes.

VERTICAL BORING AND TURNING MILLS.

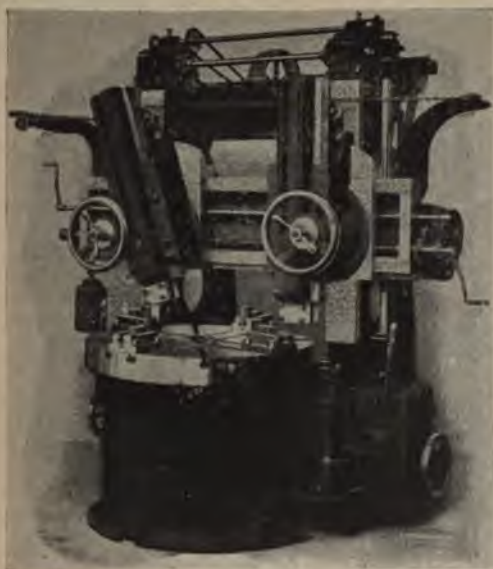


FIG. 11469.

**48" MILL WITH TWO PLAIN SWIVEL HEADS
AND CHUCK JAWS FITTED TO PLAIN
TABLE.**

**DESCRIPTION FIGS. 11468 AND 11469.—
Continued.**

Brake.—Machine is provided with friction brake, which is operated by treadle placed within easy reach of operator at the front of machine. The friction is applied to the inside of the lower driving cone pulley by means of a taper friction, and by operating directly upon the prime mover all shock and jar is eliminated and the table brought to a dead stop instantly in any desired position. The conical type of brake which is used prevents any distortion to bearings.

Guards.—All gears are thoroughly protected by guards.

Motor drive.—This machine can be driven by either a constant or variable speed motor without changing the construction, and motor can be attached at any time.

Bronze bushings are furnished for all high speed journals.

Thread cutting attachment for cutting all standard threads from 2 to 14 per inch, including 11½, can be attached to right hand head. Furnished only when specially ordered, but can be attached at any time.

Countershaft has tight and loose pulleys 16" in diameter for 5" belt and one 20" pulley for 4" belt, driving to 20" pulley on jack shaft, which also carries a four step cone for 3½" double belt. The jack shaft is attached to the upper part of housings on the machine. Speed of countershaft should be 430 revolutions per minute.

Floor space is reduced to the minimum on account of the compact design. Actual space required being 112" by 80".

Net weight, 14,500 lbs.

SPECIFICATIONS.

Swing.....	48"
Maximum distance under cross rail.....	34"
Table diameter.....	40"
Travel of ram,.....	29"
Diameter of tool holder shank.....	3"
Largest diameter of cone pulley.....	16"
Smallest diameter of cone pulley.....	8"
Countershaft (see description above).	

VERTICAL BORING AND TURNING MILLS.

50" MILL WITH PLAIN TABLE.



FIG. 11470.

DESCRIPTION FIG. 11470.

The capacity of this mill is full 54" in diameter and will take 48" under the cross rail. It is built to take the heaviest cuts with high speed steels, is of massive proportions, in fact is the most powerful and rugged mill of its swing on the market.

The table is 50" in diameter, with spur gear drive. It is of massive construction and ample provision is made in the T slots for securing any description of work. A set of four extra heavy chuck jaws furnished to fit the plain table upon order. There are ten changes of speed graded in geometrical progression, varying from 2½ to 45 revolutions per minute.

The table spindle has large angular bearing at the top and two straight vertical bearings. The angular bearing makes it self-centering and its own weight, as well as that of the table and load, has a tendency to maintain its perfect alignment.

The heads are entirely independent in their movements, both as to direction and amount of feed, and can be set to any angle either side of central position. Both heads may be brought to the center for boring. The rams are massive, have a travel of 26" in vertical or angular directions, and have steel racks and pinions. The saddles have large arched tops and there are six ½" clamping bolts holding the screw to the saddle, thus securing the greatest possible rigidity. The tool holders are steel forgings with shanks 3" in diameter, and have an adjustment of 4" in the ram.

The cross rail is 7' 6" long, of the box girder type, the back strongly arched between the housings, extra heavy, and is raised and lowered by power.

Feeds are positive gear driven, have ten changes, ranging from .025" to .500" horizontally, and from .020" to .400" in vertical or angular directions.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together.

Cone pulleys do not overhang, but are carried on heavy shafts and supported by bearings on each side, thus eliminating any tendency of the bearings to wear out of true caused by the pull of the belt. This arrangement of the cone pulleys and driving pulley between the housings secures absolute rigidity and does away with the vibration which is unavoidable on mills with overhanging cones. The cones have five sections for 3" double belt.

Main drive.—All the driving mechanism for the main spindle is self-contained in a separate head stock, which is secured to the bed between the housings. The gears are thoroughly protected by suitable guards. If necessary, the entire drive can be removed from the machine in a few minutes.

Brake.—This mill is provided with a friction brake, which is operated by a treadle placed within easy reach of the operator at the front of machine. The friction is applied to the inside of the lower driving cone pulley by means of a taper friction cone, and by operating directly upon the prime mover all shock and jar is eliminated and the table brought to a dead stop instantly in any desired position. The conical brake entirely avoids any distortion to bearings.

Guards.—All gears and the entire driving mechanism are thoroughly protected by guards.

Motor drive.—This machine can be driven by either a constant or variable speed motor without changing the construction, and motor may be attached at any time.

Brass bushings are furnished for all high speed journals, and special attention has been given to their proper lubrication.

Thread cutting attachment for cutting all standard threads from 4 to 14, including 11½ per inch, can be attached to right hand head. Furnished only when specially ordered, but may be attached at any time.

Countershaft has tight and loose pulleys 20" in diameter for 6" belt and one 24" pulley for 5" belt, driving to 24" pulley on jack shaft,

VERTICAL BORING AND TURNING MILLS.

60" MILL WITH PLAIN TABLE.



FIG. 11471.

DESCRIPTION FIG. 11470.—Continued.

which also carries a five step cone for 3" double belt. The jack shaft is attached to the upper part of housings on the machine. Speed of countershaft should be 500 revolutions per minute. Floor space is reduced to the minimum on account of the compact design. Actual space required being 10' by 7' 10" Net weight, 18,000 lbs.

Swing	54"
Maximum distance under cross rail	48"
Length of cross rail	90"
Table diameter	50"
Travel of rams	26"
Diameter of tool holder shanks	3"
Largest diameter of cone pulley	20"
Smallest diameter of cone pulley	10½"
Countershaft (see description above)	

DESCRIPTION FIGS. 11471 AND 11472.

The capacity of this mill is full 62" in diameter and will take 48" under the cross rail. It is built for heavy cuts with high speed steel, is of massive proportions and is a very rugged, powerful tool.

The table is 58" in diameter, having spur gear drive. It is of massive construction and ample provision is made in the T slots for securing any description of work. A set of four extra heavy chuck jaws furnished to fit the plain table upon order. There are ten changes of speed graded in geometrical progression, varying from 2 to 38½ revolutions per minute.

The table spindle has large angular bearing at the top and two straight vertical bearings. The angular bearing makes it self-centering and its own weight, as well as that of the table and load, has a tendency to maintain its perfect alignment.

The heads are entirely independent in their movements, both as to direction and amount of feed and can be set to any angle either side of central position. Both heads may be brought to the center for boring. The rams are very massive, have a travel of 26" in vertical or angular directions, and have steel rarks and pinions. The saddles are made with large arched tops and there are six ¾" clamping bolts holding the swivel to the saddle, thus securing great rigidity. The tool holders are steel forgings with shanks 3" in diameter, and have a vertical adjustment of 4" in the ram.

The cross rail is 8' 4½" long, of the box girder type, the back strongly arched between the housings, extra heavy, and is raised and lowered by power.

Feeds are positive gear driven, have ten changes, ranging from .025" to .500" horizontally and from .020" to .400" in vertical or angular directions.

A safety device prevents injury to mechanism in case heads are accidentally allowed to come together.

Cone pulleys do not overhang, but are carried on heavy shafts and supported by bearings on each side, thus eliminating any tendency for the bearings to wear out of true caused by the pull of the belt. This arrangement of the cone pulleys and driving pulley between the housings insures absolute rigidity and does away with the vibration which is unavoidable on mills with overhanging cones. The cones have five sections for 3" double belt.

VERTICAL BORING AND TURNING MILLS.

60" MILL, REAR VIEW.

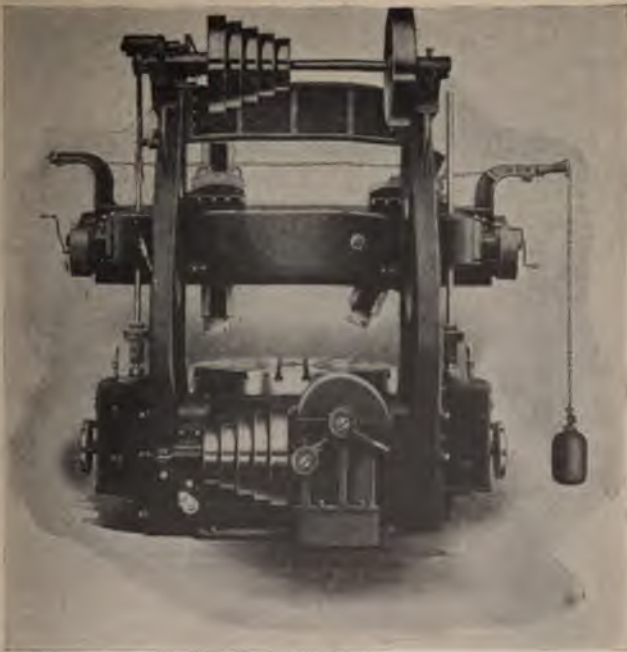


FIG. 11472.

DESCRIPTION FIGS. 11471 AND 11472.—Continued.

Main drive.—All the driving mechanism for the main spindle is self-contained in a separate head stock, which is secured to the main bed between the housings. The gears are thoroughly protected by suitable guards. If necessary, the entire drive can be removed from the machine in a few minutes.

Brake.—This mill is provided with friction brake, which is operated by treadle placed within easy reach of operator at the front of machine. The friction is applied to the inside of the lower driving cone pulley by means of taper friction cone, and by operating directly upon the prime mover all shock and jar is eliminated and the table brought to a dead stop instantly in any desired position. The conical brake entirely avoids any distortion to bearings.

Guards.—All gears and the entire driving mechanism are thoroughly protected by guards.

Motor drive.—This machine can be driven by either a constant or variable speed motor without changing the construction, and motor may be attached at any time.

Bronze bushings are furnished for all high speed journals, and special attention has been given to their proper lubrication.

Thread cutting attachment for cutting all standard threads from 4 to 14, including 11½, can be attached to right hand head. Furnished only when specially ordered, but can be attached at any time.

Countershaft has tight and loose pulleys 20" in diameter for 6" belt and one 24" pulley for 5" belt, driving to 24" pulley on jack shaft, which also carries a five step cone for 3" double belt. The jack shaft is attached to the upper part of housings on the machine. Speed of countershaft should be 425 revolutions per minute.

Floor space is reduced to the minimum on account of the compact design, actual space required being 10' 9" by 7' 10"

Net weight: 19,500 lbs.

Swing.....	62"
Maximum distance under cross rail.....	48"
Length of cross rail.....	100½"
Table diameter.....	58"
Travel of rams.....	26"
Diameter of tool holder shanks.....	3"
Largest diameter of cone pulley.....	20"
Smallest diameter of cone pulley.....	10½"
Countershaft (see description above).....	

VERTICAL BORING AND TURNING MILLS.

72" DOUBLE HEAD MILL.



FIG. 11473.

DESCRIPTION FIG. 11473.

Vertical boring and turning mills are now extensively used, owing to their many features of advantage, for doing a variety of work, not found in other tools. The mills illustrated by Fig. 11473 are of the same general design and are furnished one or two heads on the cross rail. They are built as an exclusive specialty in a shop equipped with the latest improved tools.

The heads have powerful automatic and reversible feeds, entirely independent of each other, through five step cone pulleys are counterbalanced in any position. They are made right and left so as to work close together, and can be set at an angle means of a crank handle operating on the vertical feed rod from the end of the rail. This new and simple device allows of and close adjustment when setting head accurately to a mark.

The tool spindles are octagonal in shape, fitted on alternate sides. This furnishes excellent bearings with little friction, and provision for taking up wear, oiling, etc.

Tool holders are machined from the solid steel block and will take 13 $\frac{1}{2}$ " square steel for tools.

Counterweight chains for tool spindles are so arranged that they do not cross over center of table in the way of hoisting chain traveling crane—a very important feature.

The cross rails are extra heavy and deep, have large bearing surfaces carefully planed, scraped and fitted to the saddles. The raised and lowered by power, operating through a new device easily reached on inside face of housing.

The table is very heavy and is driven by means of an internal or annular gear nearly its full diameter. This insures a steady powerful motion free from lifting or chattering tendencies.

The table spindles are extra large and long, and run on hardened and ground steel steps submerged in oil.

All gearing is cut from the solid by modern methods, and the bevel driving gears are planed. The pinion driving the table is of hard bronze, possessing great strength and excellent wearing qualities. All feed screws, rods, shafts, etc., are of steel, and main drive shafts are made of special high carbon steel and are accurately turned and fitted. The materials used in the construction of these are of the best quality and the workmanship is of the highest grade.

For specifications see following page.

VERTICAL BORING AND TURNING MILLS.

SPECIFICATIONS FIG. 11473.

	4' MILL	5' MILL	6' MILL	7' MILL	7' Special
Capacity, swing.....	50"	60"	72"	84"	90"
Capacity, under rail.....	30"	40"	48"	48"	48"
Vertical movement of tool spindle.....	24"	24"	30"	30"	30"
Size of tool spindle.....	6" x 46"	6" x 36"	6½" x 50"	6½" x 50"	6½" x 50"
Size of table.....	49"	54"	62"	72"	73½"
Size of table spindle, upper journal.....	8"	10"	12"	14"	14"
Size of table spindle, lower journal.....	6"	6"	7"	7"	7"
Size of table spindle, length.....	48"	48"	55"	55"	50"
Number of steps on cone pulley.....	4	5	5	7	7
Size of countershaft pulleys.....	20"	22"	24"	26"	26"
Speed of countershaft, revolutions.....	130	130	130	130	130
Approximate gross weight, boxed for export.....	15,000 lbs.	18,250 lbs.	21,000 lbs.	28,000 lbs.	.....
Approximate net weight, boxed for export.....	13,000 lbs.	16,000 lbs.	20,000 lbs.	25,000 lbs.	.....

*Can furnish special 80" table.

60" BORING AND SPLINING MACHINE.

DESCRIPTION FIG. 11474.

This machine is designed for quick and accurate boring and splicing of pulleys, balance wheels, gear blanks and similar work. Every part of the machine is made heavy and strong to withstand the strain of heavy cuts and coarse feeds.

SPECIFICATIONS.

- Length of machine, 8' 3".
- Width, 5' 2".
- Height to top of pulleys, 6' 7".
- Height with ram at highest point, 10' 8".
- Tight and loose pulleys on countershaft, 16" diameter, 4½" face, and should run 80 revolutions per minute.
- Tight pulley on machine to drive splicing attachment, 20" diameter, 2" face, and should run 360 revolutions per minute.
- Table 62" diameter.
- Machine will bore a pulley 60" diameter, 30" face.
- Distance from top of table to underside of head, 3' 4".
- Shipping weight about 8,000 lbs.



FIG. 11474.

HORIZONTAL BORING AND DRILLING MACHINES.

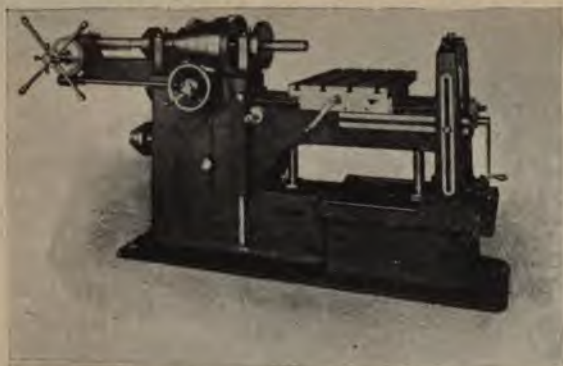


FIG. 11475.

DESCRIPTION FIG. 11475.

This machine is well adapted to general work. Although designed for a medium sized machine, its strong working parts, together with its heavy column and rigid bar support, make it especially useful for the larger class of work.

The spindle is $2\frac{1}{4}$ " in diameter and will feed $20''$. The feed is worked by hand, by means of the wheel at the left of the knee, and is made automatic by turning the friction knob. There are four changes of feed. Quick movement is given to the spindle by turnstile at left of the cut. The hole in front end of spindle is B. & S. taper No. 10.

The cone has four steps for $3''$ belt, the largest diameter being $13''$. With a countershaft speed of 150 revolutions per minute, the spindle speeds are 278, 183, 122 and 80, without back gears, and 36, 24, 16 and 10, with back gears.

The table is $20''$ by $36''$. It has a cross movement of $29''$, a lateral movement of $26''$, and a vertical movement of $20''$. The greatest distance from top of table to center of spindle is $21''$.

The knee is $48''$ long, and can be raised or lowered from either the end or side. The elevating screws are geared together and provided with an adjustment by means of which the table can be kept parallel with the spindle. The greatest distance from the face plate to the outer support for bar is $3' 6''$.

A rotary table can be furnished upon special order. It is $20''$ x $20''$, and the circular base is graduated to degrees. A facing head is furnished as an extra when specially ordered.

A double friction countershaft is furnished. It has $12''$ pulleys for $3\frac{1}{2}''$ belt, and should run at a speed of 150 revolutions per minute. Floor space of machine $6'$ by $10' 6''$. Weights: net 4,400 lbs.; crated 4,700 lbs.; boxed for export 5,300 lbs. Cubic measurement boxed, 100 cubic feet.



FIG. 11476. FRONT VIEW.

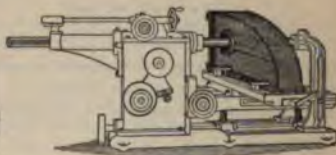


FIG. 11477. MACHINE IN OPERATION.

SPECIFICATIONS FIGS. 11476 TO 11478.

Boring bar $4\frac{1}{4}''$ in diameter, automatic feed $42''$.

Maximum distance between center of boring bar and carriage, $27\frac{1}{2}''$.

Maximum distance between center of boring bar and knee, $33\frac{1}{2}''$.

Carriage is $25''$ wide and $60''$ long, with automatic feed of $36''$. The knee can be made either $6'$ or $9'$ long.

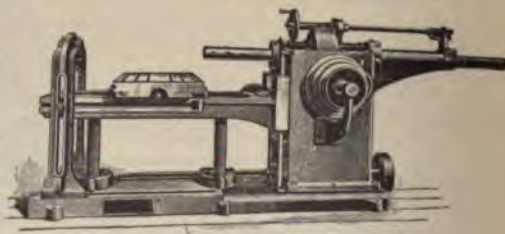


FIG. 11478. REAR VIEW.

HORIZONTAL DRILLING, BORING AND TAPPING MACHINE.

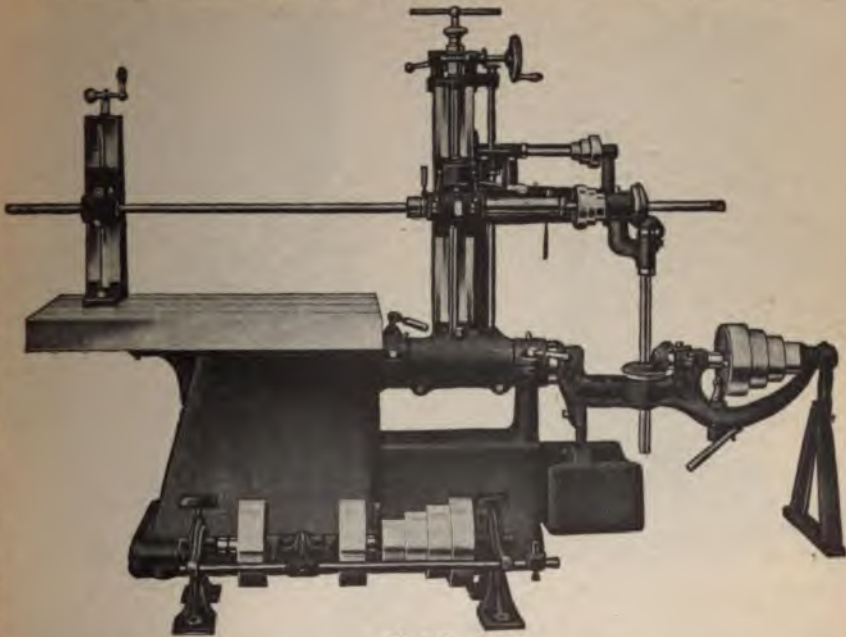


FIG. 11479.

DESCRIPTION FIG. 11479

This new machine has been designed particularly for work which, by reason of length, cannot be handled advantageously on either an upright or a radial drill. It is specially adapted for drilling in the end of long pieces, and also in heavy castings where holes are required in different places, and generally for any work within the range of its capacity which cannot be done at all, or with difficulty, on a vertical drilling machine. It is provided with a reversing friction countershaft, adapting the machine for tapping as well as drilling, and is capable of drilling up to $1\frac{1}{2}$ " and tapping up to $1\frac{1}{8}$ ".

For boring work we can furnish a boring bar support, as shown in cut, also when required a boring bar of suitable size.

The cut shows very clearly the construction of the machine, and its method of operation will be easily understood. The upright arm swings on journals which are in line with the cone shaft, and is properly counterweighted as shown. It can be swung in either direction and moves through 180° of a circle, having a radius of $24"$. The spindle is provided with power feed, hand worm feed and also quick return mechanism. The machine can be furnished either with or without back gearing, as required. The greatest distance from table to center of spindle when the swinging arm is in a vertical position is $17"$, and when the arm is swung so that the spindle is on a level with the table, the greatest distance from the center of table to center of spindle is $22\frac{1}{2}"$. The spindle can be operated at any point through 145° of a circle having a radius of $24"$. The table is $20"$ by $40"$ and has lateral T slots, so that the work can be held either in jigs or bolted to the table. The spindle is $1\frac{1}{8}"$ in diameter and is fitted with No. 3 Morse taper, and can be furnished with either 10° or 15° travel. Required floor space, with 10° spindle travel, $90"$ by $42"$, or with 15° spindle travel, $96"$ by $42"$.

The tight and loose pulleys on countershaft are $8\frac{1}{2}"$ by $2\frac{1}{2}"$, and should be speeded 450 revolutions per minute.

	Net.	Crated.	Boiled.
Weight, with 10° spindle travel.....	1,800 lbs.	2,000 lbs.	2,260 lbs.
Weight, with 15° spindle travel.....	1,950 lbs.	2,150 lbs.	2,400 lbs.

HORIZONTAL BORING, DRILLING AND MILLING MACHINES.

NO. 1 MACHINE.

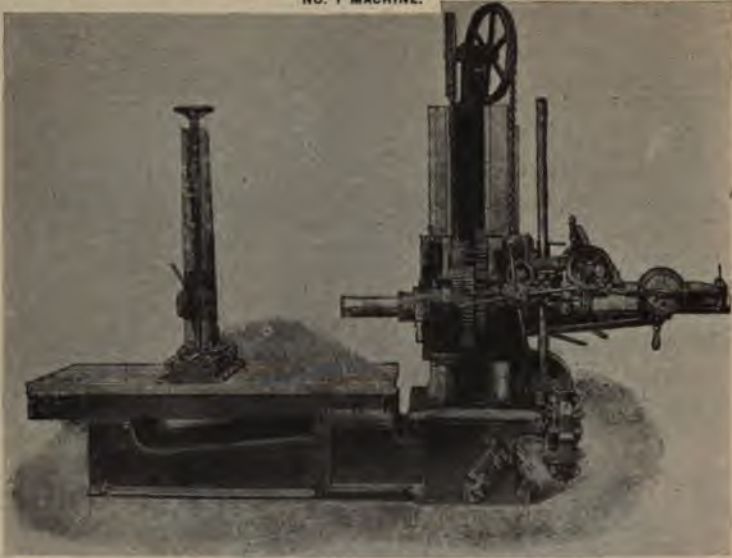


FIG. 11480.

DESCRIPTION FIG. 11480.

Our new No. 1 horizontal boring, drilling and milling machine, as illustrated and described herewith, will perform the various operations of boring, drilling, tapping, reaming, facing, milling, etc., on both light and heavy work in the most economical manner possible, being accurate and rapid in its different operations and adjustments.

All of the different operations mentioned above can be performed on a piece of work fastened to the table in one setting, insuring the most accurate and profitable results.

The machine is driven by a spined shaft which traverses the driving cone on the rear of bed.

The column carrying the spindle head has horizontal movement on the bed by hand or power in both directions; also a quick forward and return motion by power operated by the hand wheel conveniently located on the front of bed.

The spindle head, which is counterbalanced and provided with a safety chain, has vertical movement on the column by hand or power in both directions, and for quick adjustment is easily operated by means of the pilot wheel on front of spindle head.

The spindle runs in adjustable bronze bearings and has a thread cut on its front part to receive chucks, large milling cutters, facing heads, etc., for very heavy work; it revolves in right or left hand directions and can be started, stopped, or reversed instantly; this is very convenient for facing, tapping, milling, and other operations.

The spindle bar, which passes through the spindle, is 4" in diameter, has 22° traverse and is fitted with a No. 5 Morse taper to receive drills, taps, reamers, boring bars, milling cutters, etc.; it has power and hand feed in both directions, is operated from the pilot wheel for quick adjustment and can be securely clamped for face milling purposes. For very heavy work the cutter or boring bar is secured by a Kottler fitted to the spindle bar.

The back gears are located on the spindle head, bringing the power direct to the work, thus relieving the outer shafts from unnecessary strain, also reducing the vibration of the cutting tools to the minimum. The lever for operating the back gears is conveniently located on the spindle head, and they can be engaged or disengaged while the machine is running.

The outer support for boring bar can be clamped securely to the table and has horizontal and vertical adjustment. It is provided with graduated steel rules, as is also the face of the column and the bed, the spindle sleeve being graduated.

The table in which the T slots are planed is stationary and securely bolted to the bed and base, insuring perfect alignment of the work.

All the feeds, as horizontal feed of column, horizontal feed of spindle bar and vertical feed of spindle head, are taken from the spindle; they are positive geared, eight in number, by hand or power, and are arranged in geometrical progression from $\frac{1}{16}$ " to $\frac{1}{4}$ " per revolution of spindle. All feeds are reversible.

The spindle speeds are ten in number, arranged in geometrical progression from 4 to 260 revolutions per minute.

The gear ratio from the cone driving shaft to spindle is 25:1; that is, when the driving shaft makes 25 revolutions, the spindle makes 1. The ratio of back gears is 13.6:1.

All bearings are bronze bushed.

All shafts are ground.

All bevel and miter gears are planed from the solid.

The No. 2 machine is of similar design, but larger and heavier.

Specifications of both No. 1 and No. 2 machines will be found on following page.

HORIZONTAL BORING, DRILLING AND MILLING MACHINES.

SPECIFICATIONS FIG. 11480.

	No. 1.	No. 2.
Diameter of spindle bar.....	3½"	4"
Diameter of spindle nose.....	5½"	6"
Spindle bored to fit Morse taper.....	No. 5	No. 6
Traverse of spindle.....	22"	28"
Vertical adjustment of head on column.....	30"	34"
Horizontal adjustment of column on bed.....	32"	62"
Maximum distance table to center of spindle.....	44"	62"
Minimum distance table to center of spindle.....	8"	8"
Height of table from floor.....	22"	22"
Size of table.....	31" x 72"	36" x 120"
Number of spindle speeds.....	10	10
Range of spindle speeds, revolutions per minute.....	4 to 200	4 to 200
Number of feeds (in all directions).....	8	8
Range of feeds.....	1/1000" to 1/4"	1/1000" to 1/4"
Tight and loose pulley on countershaft.....	16" x 4"	16" x 4"
Speed of countershaft, revolutions per minute.....	228	228
Width of belt on cone.....	3½"	3½"
Distance end of pulley shaft to end of bed.....	9' 9"	12' 3"
Distance end of spindle to end of table.....	12' 6"	16' 6"
Total height of machine.....	8'	9' 6"
Net weight.....	12,000 lbs.	15,000 lbs.

For general description see preceding page.

40" HORIZONTAL BORING, DRILLING AND MILLING MACHINE.

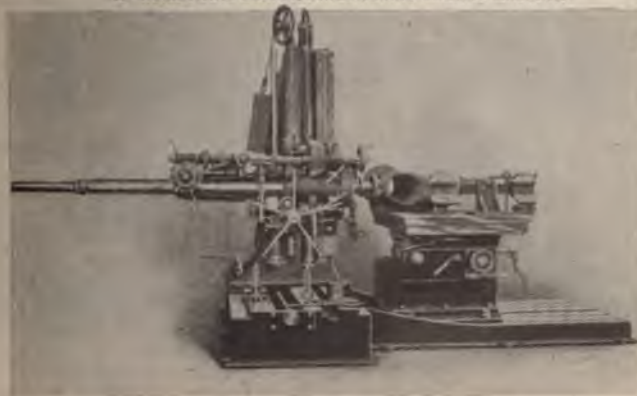


FIG. 11481.

DESCRIPTION FIGS. 11481 TO 11483.

The machine consists of a bed plate on the high portion of which is fitted a column made every stiff and rigid, two sides being vertical, while the others taper to a broad base which is gibbed down to a sliding fit on a wide scraped bearing. This column can be arranged to have any reasonable longitudinal traverse. On this column is a saddle having a long bearing scraped to a sliding fit carrying a spindle of suitable diameter provided with a geared feed motion and the end arranged for a Morse taper. The saddle is fully counterbalanced and is raised and lowered by hand. The spindle is moved by hand, either slowly for feeding or rapidly by spoke wheel for quick adjustment, but in addition the spindle has several power feeds. Back gearing is applied on the saddle at the front end of the driving screw and provision is made for taking up any lost motion in the spindle.

HORIZONTAL BORING, DRILLING AND MILLING MACHINES.

DESCRIPTION FIGS. 11481 TO 11483.—Continued.

To the other portion of the bed plate is fitted the universal table which is capable of handling work of several thousand pounds weight. This table (which is usually furnished with the 40" machine only) has a sliding movement of 30° to and from the column, being operated by a rack and pinion. The top is 50" x 38" and has a pivoted movement, from a horizontal to a vertical plane and can be rigidly clamped at any angle. It also has a rotary movement, which makes it possible to drill holes in any part of a hemisphere or in five sides of a cube without reChucking the work. There is an oil channel around the outer edge from which the lubricant can be drained back to the tank. When large work is to be machined the table can be removed from the work bed. When this machine is to be used for boring, an

40" MACHINE PERFORMING VARIOUS OPERATIONS.

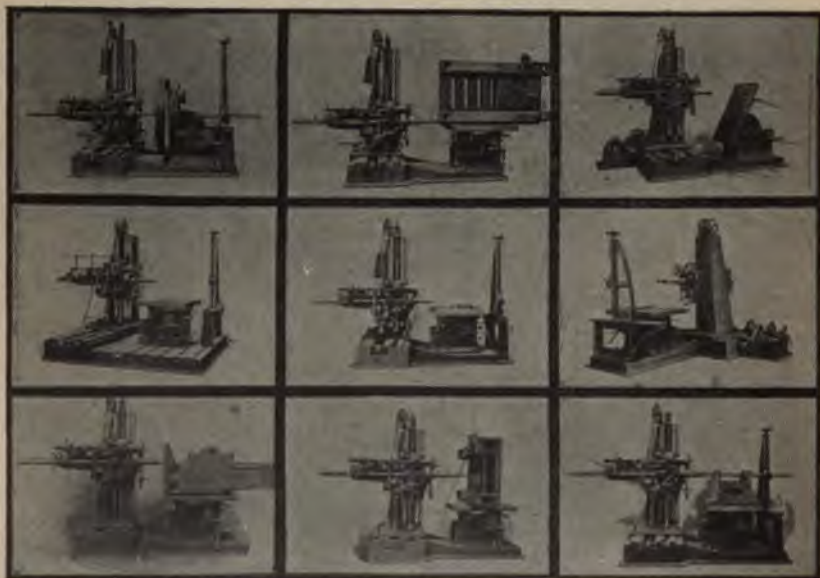


FIG. 11482.

outside support for the bar is furnished, which can be used either with or without the universal table. Steel scales for accuracy of adjustment are also furnished if desired. These machines are built for either belt or motor drive. When a motor is used a special arrangement of cone gearing gives the different speeds without the use of belts.

40" MACHINE.

Vertical movement of saddle, 40°. Horizontal traverse of column, 40° or more if desired. Diameter of spindle, 3¼". Horizontal movement of spindle, 24". In two reaches, 36° or 48°. End of spindle arranged for No. 5 Morse taper.

HORIZONTAL BORING, DRILLING, AND MILLING MACHINES.

DESCRIPTION FIGS. 11481 TO 11483.—Continued.

Two changes of speed to spindle. Six drilling and boring feeds. Three reversible vertical and horizontal milling feeds. Height over all, 9'. Floor space required, with standard bed plate, 15' x 9' 2".

Speed of countershaft, 200 revolutions. Driving belt, 3½". Size of tight and loose pulleys for belt driven machine, 16" x 4½". A constant speed motor of 3½ horse-power required.

This size is usually arranged for drilling and boring only, the column having a hand and quick power movement, but automatic feeds can be attached for light milling if required.

40" x 40" standard machine, boxed for shipment, 350 cubic feet. Weight about 18,500 lbs. Universal table, boxed, about 3,575 lbs. Outboard support, boxed, about 1,200 lbs.

72" MACHINE.

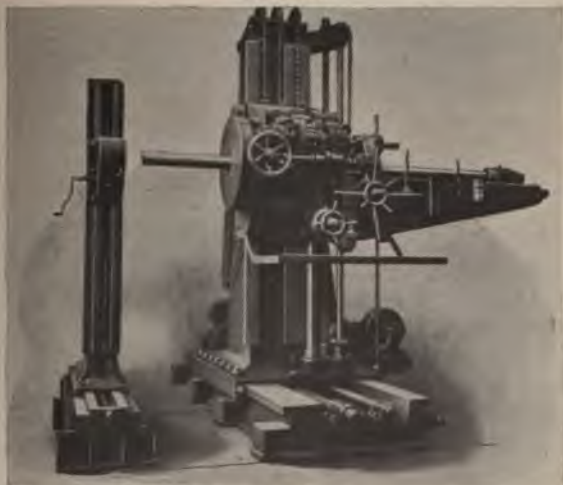


FIG. 11483.

72" MACHINE.

Vertical movement of saddle, 72". Horizontal traverse of column, 72" or more if desired. Diameter of spindle, 5½". Horizontal movement of spindle, 36". End of spindle arranged for No. 6 Morse taper.

Twenty changes of speed to spindle. Ten drilling and boring feeds. Eight reversible vertical and horizontal milling feeds.

Height over all, 14'. Floor space required without bed plate for work, 20' x 12'.

Speed of countershaft, 175 revolutions. Driving belt, 4". Size of tight and loose pulleys for belt driven machine, 20" x 5½". A constant speed motor of 7½ horse-power required.

Facilities are provided on this size for heavy milling as well as for boring and drilling.

72" x 72" standard machine, boxed for shipment, 850 cubic feet. Weight about 40,000 lbs. Outboard support, boxed, about 5,500 lbs. Weight of outside work bed, 160 lbs. per square foot.

120" MACHINE.

This machine is similar in design to the 72" machine above described. Complete specifications sent upon application.

HORIZONTAL FLOOR BORING AND MILLING MACHINES.

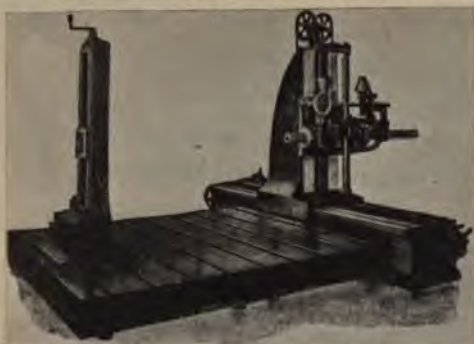


FIG. 11484.

DESCRIPTION FIG. 11484.

Machines have eight changes of automatic feed to the boring bar, four slow feeds for roughing and four fast feeds for finishing; the spindle head has a vertical feed for milling, and upright has a feed on bed for milling; both these movements can also be operated quickly by power for adjusting machine to position.

The price includes the necessary countershaft, wrenches and outside support for bar; it does not include the work table or floor plate.

We will furnish drawings of any size of work table, so that it can be attached after machine is received; or if size is given, will quote price where desired.

	No. 258.	No. 260.
Diameter of boring bar.....	4"	5½"
Length of feed to boring bar....	32"	50"
Vertical feed to spindle head....	3' 6"	5'
Horizontal feed of upright on base.....	6'	8'

HORIZONTAL CYLINDER BORING MACHINES.

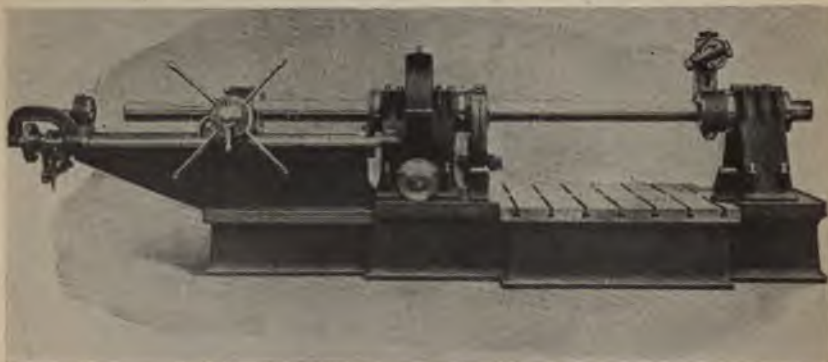


FIG. 11485.

DESCRIPTION FIG. 11485.

NO. 1 CYLINDER BORING MACHINE.

Bed is 10' 11" long; widened portion 30" x 55" long, 18" high. Machine has a continuous feed travel in either direction of 48", and will bore and face both ends of a cylinder at the same time. The boring bar is 3¼" in diameter, with forty points of carbon. Pedestals are 18" from top of bed to center of bar. Power is transmitted by the Albro worm and worm wheel, geared 45 to 1, affording a very smooth and even motion to boring bar, particularly desirable in cylinder boring and work of similar character. The cone has four steps 4¼" wide by 10", 13", 16", 19" in diameter. The equipment of the machine consists of the two facing arms, countershaft, and necessary wrenches.

Speed of countershaft 250 revolutions per minute. Tight and loose pulleys, 12" x 5".

HORIZONTAL CYLINDER BORING MACHINES.

DESCRIPTION FIG. 11485—(Continued)

FIG. 11485—BORING MACHINE.

Has a 12' 0" long, widened portion 48" x 22" long by 12" high. Machine has a continuous feed tray in either direction of 60°, and will bore and face both ends of a cylinder at the same time. The boring bar is 4" in diameter, made of hardened steel with forty points of contact. Toolholders are 24" from top of bed to center of bar. Power is transmitted by the Albee worm and worm wheel, geared 70 to 1, affording a very smooth and even motion to the boring bar, particularly desirable in cylinder boring, and work of similar character. The cone has five steps 1½" wide by 12", 16", 19", 22" and 25" in diameter. The equipment of machine consists of the two facing arms, countershaft and necessary wrenches.

Speed of countershaft, 250 revolutions per minute. Tight and loose pulleys, 18" x 8".

Note: Gear drive, shown in Fig. 11488, is furnished at extra cost only. Length of bed and bar can be changed to suit requirements.

FIG. 11486—MACHINE, BETTER DESIGN.



FIG. 11486.

DESCRIPTION FIG. 11486.

Has a very heavy bed, 14' 6" long; widened portion 24" x 24" long by 18" high. Machine has a continuous feed tray in either direction of 60°, and will bore and face both ends of a cylinder at the same time. The boring bar is 4" in diameter, made of hardened steel with forty points of contact. Toolholders are 24" from top of bed to center of bar. Power is transmitted by the Albee worm and worm wheel, geared 70 to 1, affording a very smooth and even motion to the boring bar, particularly desirable in cylinder boring, and work of similar character. The cone has five steps 1½" wide by 12", 16", 19", 22" and 25" in diameter. The equipment of machine consists of the two facing arms, countershaft and necessary wrenches.

Speed of countershaft, 250 revolutions per minute. Tight and loose pulleys, 18" x 8".

Motor drive, shown in cut, is furnished at extra cost only.

Cross table, shown in Fig. 11488, can be supplied if desired.

Longer length of bed and bar can be furnished.

HORIZONTAL CYLINDER BORING MACHINES.

NO. 5 CYLINDER BORING MACHINE.

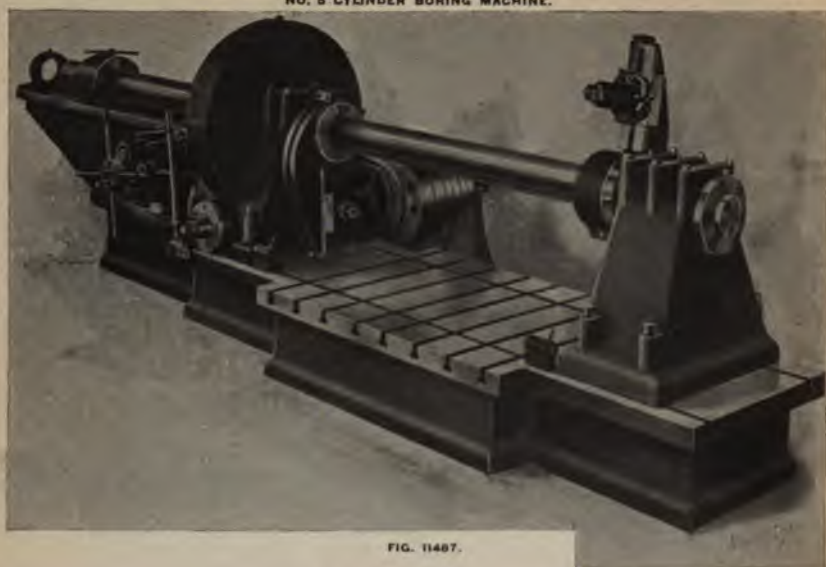


FIG. 11467.

For description, see next page.

NOS. 6 AND 7 CYLINDER BORING MACHINES WITH CROSS TABLE.

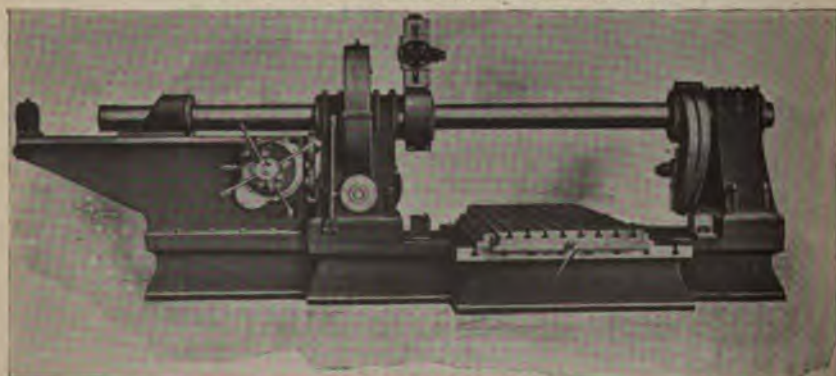


FIG. 11468.

For description, see next page.

HORIZONTAL CYLINDER BORING MACHINES.

DESCRIPTION FIGS. 11487 AND 11488.

No. 5 Machine.—Bed is 15' 5" long; widened portion 51" x 64" long, 18" high. Machine has a continuous feed travel in either direction of 60°, and will bore and face both ends of a cylinder at the same time. The boring bar is 7" in diameter, made of hammered steel with forty points of carbon. The pedestals are 28" from top of bed to center of the bar. Power is transmitted by the Albro worm and worm wheel, geared 78 to 1. It is equipped with our patented variable feed device, which has fourteen different feeds ranging from $\frac{1}{16}$ " to $\frac{3}{4}$ ". The boring bar has quick travel in either direction.

A cross table similar to that shown in Fig. 11488 can be supplied if desired.

Length of bed and bar can be altered to suit requirements.

Speed of countershaft 250 revolutions per minute.

No. 6 Machine.—Bed is 15' 5" long; widened portion 72" x 64" long, 18" high. Machine has a continuous feed travel in either direction of 60°, and will bore and face both ends of a cylinder at the same time. The boring bar is 8" in diameter, made of hammered steel, with forty points of carbon. The pedestals are 32" from top of bed to center of the bar. Power is transmitted by the Albro worm and worm wheel, geared 85 to 1. It is equipped with our patented variable feed device, which has fourteen different feeds ranging from $\frac{1}{16}$ " to $\frac{3}{4}$ ". The boring bar has a quick travel in either direction by power.

Speed of countershaft 250 revolutions per minute.

Cross table is 30" wide, 6" thick, 8' 5" long, and has a cross travel of 30°.

Cross table not furnished regularly, only when specified.

Length of bed and bar can be altered to suit requirements.

No. 7 Machine.—Bed is 16' 3" long; widened portion 72" x 64" long, 18" high. Machine has a continuous feed travel in either direction of 60°, and will bore and face both ends of a cylinder at the same time. The boring bar is 8" in diameter, made of hammered steel, with forty points of carbon. The pedestals are 36" from top of bed to center of the bar. Power is transmitted by the Albro worm and worm wheel, geared 100 to 1. It is equipped with our patented variable feed device, which has fourteen different feeds ranging from $\frac{1}{16}$ " to $\frac{3}{4}$ ". The boring bar has a quick travel in either direction by power.

Speed of countershaft 250 revolutions per minute.

Cross table is 30" wide, 6" thick, 8' 5" long, and has a cross travel of 30°.

Cross table not furnished regularly, only when specified.

Length of bed and bar can be altered to suit requirements.

THREE WAY FACING MACHINE.

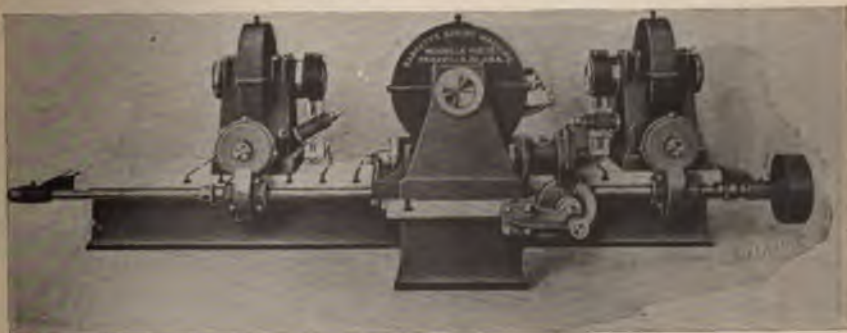


FIG. 11489.

DESCRIPTION FIG. 11489.

This machine is especially designed for the purpose of facing such work as water gates or valves, tees, elbows, etc., operating on one, two or three surfaces at the same time, as may be desired; the work being held in a fixture suitable for the purpose, supplied by user.

The bed consists of two parts 18" high by 28" wide, which can be furnished of any length to suit the user, with several T slots for convenience of securing the work. The heads are 22" from top of bed to center of the spindles, and are all adjustable on top of bed in either direction and independent of one another. They are driven by one belt running onto a single pulley, this being accomplished by helical and bevel gears. The facing blocks on the arms are fed by means of star wheel and pins. The driving power is three Albro worm and worm wheels.

IMPROVED PORTABLE LOCOMOTIVE CYLINDER BORING BAR AND FIXTURES.

DESCRIPTION FIG. 11490.



FIG. 11490.

This portable boring bar and fixtures is designed to bore out locomotive cylinders in place. The fixtures that go with the bar allow cylinders to be bored where it is not desirable to take off the cylinder and guides. After removing the gland and packing, a suitably arranged cone bearing is placed in the opening and supports the bar perfectly central, it being only necessary to use one cross head and two blocks to support the front end. There is furnished an extra cross head to support and adjust the bar when boring cylinders with both heads off. (See cut.) This being a travelling

bar, it is necessary to have the feeding thrust so arranged that it will have no tendency to force the bar out of line (which often causes the tools to cut and chatter on one part of a revolution). We have in this, our improved machine, overcome these difficulties and have a perfect working tool that gives a first class finishing cut and perfectly true.

The feed nut is in halves, held together by a round milled nut, so that when the cut is through cylinder, unscrew the round nut, open the halved nuts, loosen the tools so that they will not mark the cylinder in moving back, push the bar back until cutter head is in place for another cut or to counter bore. To stop the feed at any time pull out the slip pin top shaft. This pin is useful in starting cuts for hand feed, etc.

We build these machines of any length, 8' being the usual length.

These bars are perfectly straight and round; bearings fitted by scraping. For driving, either a pulley for power, or small fly-wheel with handle for hand driving.

2½" x 8' bar will rebore cylinders 8" to 16" diameter. Weight, boxed 850 lbs.

3" x 8' bar will rebore cylinders 10" to 20" diameter. Weight, boxed 1,000 lbs.

3¼" x 8' bar will rebore cylinders 10" to 24" diameter. Weight, boxed 1,150 lbs.

PORTABLE CYLINDER BORING BAR.

DESCRIPTION FIG. 11491.

This portable tool is designed for general boring, being made in several sizes. All kinds of engines, steam hammers, pumps, blowing engines, air compressors, Corliss valves, etc., can be bored in place. It has fixtures for boring (with one or both cylinder heads off) in any position and in very cramped places, as on board ship, etc. It can be readily operated in a space that is large enough to take the piston out of the cylinder. Many times cylinders can be rebored in place in less time than they could be removed from fixed position, leaving all steam connections, holding-down bolts, etc., intact. Enough cutter heads are furnished with each size bar to bore diameters given for each diameter of bar. These bars are powerfully geared and can be driven by power or hand. Each bar has two changes of feed; the feed screw is steel; the feed nut is also made of steel, cut in a peculiar way, insuring great wear.

A full complement of expanders will be sent to fit stuffing boxes. One set of sample tools and wrenches are furnished with each outfit. We are prepared to make special sizes for special work.

For sizes, etc., see following page.

262



FIG. 11491.

PORTABLE CYLINDER BORING BARS.

FIG. 11491.—Continued.

SPECIFICATIONS.

2½" bar, to bore 4" to 12" diameter x 30" stroke, bar 5' long.	Weight, 700 lbs.
3" bar, to bore 6" to 16" diameter x 36" stroke, bar 5½' long.	Weight, 800 lbs.
3½" bar, to bore 8" to 22" diameter x 42" stroke, bar 6' long.	Weight, 962 lbs.
4" bar, to bore 10" to 24" diameter x 60" stroke, bar 8' long.	Weight, 1,550 lbs.
4" bar 5' 6" long, for locomotives. To bore from 12" to 20" diameter.	"Special"
4½" bar, to bore 12" to 20" diameter x 72" stroke, bar 10' long.	Weight, 1,750 lbs.
6" bar, to bore 20" to 50" diameter x 60" stroke, bar 10' long.	Weight, 3,000 lbs.
8" bar, to bore 20" to 60" diameter x 72" stroke, bar about 11' long.	Weight, 5,000 lbs.
8" bar, to bore 20" to 60" diameter x 120" stroke, bar about 15' long.	Weight, 5,650 lbs.

SPECIAL BORING BAR FOR COMPOUND ENGINES.

DESCRIPTION FIG. 11492.

We make a special portable boring bar for all sizes of locomotive cylinders. It is adapted for the low pressure as well as the high pressure cylinders and is made special in the way of attachments covering this range of work. It is similar in appearance to our other bars. It consists of a steel bar 4" diameter, 5' 6" long. It has two cross heads; four blocks (two high and two low) for bolting on the cylinder head with the same studs or bolts that are used in securing the cylinder heads; one expanding chuck with expanding pieces to fit any size gland, to use when not necessary to remove back head or guides; a full set of cutter heads to take cylinders from 12" to 20" diameter. The geared driving power is furnished with fly wheel crank for hand, also a pulley for belt power. An extra cross head and bearing is furnished to support the back end of the bar, when necessary to bore when head and guides are removed. It is a very complete tool for this work, quickly set up, easily adjusted, quickly handled and does accurate work. The feed has two changes that are quickly changed by slipping a pin in the hand wheel shaft. Automatic in action, or easily operated by hand in starting cut, etc.



FIG. 11492.

CORLISS VALVE SEAT PORTABLE BORING BAR.



FIG. 11493.

DESCRIPTION FIG. 11493.

2½" diameter of bar, 5' long, will rebores valve seats from 3½" to 6½" diameter. Weight, 425 lbs., boxed.

3" diameter of bar, 5' long, will rebores valve seat from 4" to 8" diameter. Weight, 725 lbs., boxed.

Each size complete in all parts, with sample tools, wrenches, etc.

BORING BAR FOR LATHE WORK.



FIG. 11494.

DESCRIPTION FIG. 11494.

We build these bars of any diameter or length, with hardened steel centers to run on—(self-oiling). The feed screw and nut are made of steel. Screw is fitted with a bronze thrust bearing of improved make. Two cutter heads are furnished with each bar, and a driver plate to be bolted to face plate of lathe. Feed as shown in cut has two changes of feed in either direction; the bars are accurately ground to gauge. We build these bars only on order, varying them at times to suit requirements. Patterns on hand for bars from 4" to 14" diameter.

SIZES.

4" bar.....	6" long
4½" bar.....	7" long
5" bar.....	7" long
6" bar.....	10" long
8" bar.....	10" long
10" bar.....	12" long
12" bar.....	12" long
14" bar.....	12" long

PORTABLE FACING ARM.

DESCRIPTION FIG. 11495.

This attachment as shown in cut, we make to suit any size of our bars, and have patterns for sizes varying from 3" to 10" diameter of bar. They are readily attached, as shown in the cut. One half of the hub is bolted on to the sliding part, has a detachable crank for hand adjustment, and a star for power feed.

We also make them of different design for some kinds of work where there is not room for this style.

In ordering give largest diameter to be faced, size of bar and width of key way in the bar.

A first class attachment for a boring bar.



FIG. 11495.

FACING SPIDER FOR USE ON BORING BARS.

DESCRIPTION FIG. 11496.

The cut represents this device so clearly that very little description is necessary.

It is intended to use on our boring bars to support the bar while facing off cylinder head joints, etc. It consists of a light four arm spider, made light and strong with two sets of set screws; one set is to screw out into the cylinder, the other set screwing toward the center intended to fit into the groove of the bearing shown in the cut, thus allowing of a very fine adjustment, so that the facing is square and true with the bore of the cylinder. This leaves the cylinder end clear for the facing arm, the other or opposite end of the bar being supported with the pin of the gland chuck or cross head. It is used to advantage often when the bar is in the cylinder after boring.

When ordering, give the bore of cylinders it is to be used in; also size of bar.



FIG. 11496.

HAND POWER HYDRAULIC WHEEL PRESS.



FIG. 11497.

DESCRIPTION FIG. 11497.

This improved press embraces many changes from those first made, and is now a very complete tool for street railroad shops, small railroad repair shops and engine shops for forcing in shafts, etc.

The hydraulic part is our most reliable and convenient style of large jack. The lever works horizontally at right angles to line of press, and convenient for operator to easily watch the work. The valves are large, perpendicular and easy of access. The piston is entirely enclosed, thus preventing all grit or foreign material getting into the pump and cutting or preventing its working. The cylinder is made from crucible steel and has a good bearing on stationary beam. The

movable beam runs on rollers upon the lower bar, which is planed. It is recessed so that blocks may be placed in it of sufficient thickness to act as a template in forcing on car wheels, etc. A swinging chuck placed against the ram or jack acts as a template for the other end of axle. The block can be also used when forcing a shaft into a wheel. The pull-back weight is suspended from upper bar and does not require any pit.

- 80 ton press complete for 30" wheels, weighs about 1,900 lbs.
- 60 ton press complete for 36" wheels, weighs about 2,500 lbs.
- 100 ton press complete for 36" wheels, weighs about 2,700 lbs.
- 100 ton press complete for 40" wheels, weighs about 3,500 lbs.
- 125 ton press complete for 48" wheels, weighs about 4,500 lbs.

Larger sizes or power presses to order. A gauge will be placed on each press unless otherwise ordered.

We make a 60 ton press for 30" wheels, of special patterns, for export, where the heaviest pieces weigh not over 225 lbs., so that they may be carried by mules. It is known by us as the mule back pattern.

HYDRAULIC WHEEL PRESSES.



FIG. 11498.



FIG. 11499.

DESCRIPTION FIGS. 11498 TO 11500.

The simple construction of these presses renders all parts of easy access, the valves can be removed by unscrewing caps, and plungers can be removed by taking out the connecting rod bolts. The plungers are packed with leather rings of such construction that they pack absolutely tight under any pressure, but allow the free movement of plungers without excessive friction. The ram is packed with regular "U" hydraulic packing which can be easily removed after withdrawing the ram. For convenience in handling heavy work, the parallel bars are placed on a slight angle, as shown by end view, which permits the handling of work with an overhead crane. This is a distinct feature of our presses, and meets with universal approval. Heavy work, such as locomotive drivers, and irregular shaped work, that cannot be rolled to and from a press, can be handled with such a degree of ease and rapidity that this feature alone places our presses in advance of all other makes, in which the upper bar is directly above the lower one.

The plungers are operated by eccentrics on the back shaft which is driven by cut gears, ratio 3 1/4 to 1. This method requires a minimum amount of power and insures perfectly steady belt motion, without using an excessively wide belt. The ram is drawn back automatically as soon as the pressure is shut off from the pumps.

HYDRAULIC WHEEL PRESSES.

DESCRIPTION FIGS. 11498 TO 11500.—Continued.

No special foundation is required, as these presses are self-contained, and only require a floor strong enough to safely carry the weight of the press, and the work to be handled. We include with each press two screw hangers to attach to upper bar, drawback weight for ram, and hydraulic gauge marked in pounds per square inch and tons on ram.

An extra valve is furnished to connect with city water line, when it is convenient to do so, and by opening this valve before turning on the pressure from the pump, the ram is moved out against the work rapidly, after which the water line valve is closed and the valve to the pump is opened, giving the full pump pressure.

We give dimensions of our regular sizes, but can furnish presses of any desired capacity, or length, and fitted for any special class of work.



FIG. 11500. REAR VIEW.

30" 100 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 30"; extreme distance between ram and head block, 81½"; diameter of ram, 9½"; travel of ram, 15"; maximum working pressure, 3,000 lbs. per square inch; parallel bars, 1½" x 5" steel; single plunger pump not geared; 24" x 3½" tight and loose pulleys, 125 revolutions; weight, 4,500 lbs.; floor space, 4' x 12½'.

38" 150 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 38"; extreme distance between ram and head block, 81½"; diameter of ram, 9½"; travel of ram, 18"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2" x 6" steel; double plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 6,500 lbs.; floor space, 4½' x 15'.

48" 150 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 48"; extreme distance between ram and head block, 81½"; diameter of ram, 9½"; travel of ram, 18"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2" x 6" steel; double plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 8,000 lbs.; floor space, 4½' x 15'.

58" 150 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 58"; extreme distance between ram and head block, 81½"; diameter of ram, 9½"; travel of ram, 18"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2" x 6" steel; double plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 9,500 lbs.; floor space, 5' x 15'.

68" 200 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 68"; extreme distance between ram and head block, 81½"; diameter of ram, 11½"; travel of ram, 18"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2½" x 7" steel; double plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 10,500 lbs.; floor space, 5' x 15'.

78" 200 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 78"; extreme distance between ram and head block, 81½"; diameter of ram, 11½"; travel of ram, 18"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2½" x 7" steel; double plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 12,000 lbs.; floor space, 5' x 15'.

88" 300 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 88"; extreme distance between ram and head block, 81½"; diameter of ram, 14"; travel of ram, 20"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2½" x 8" steel; triple plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 18,000 lbs.; floor space, 6' x 16'.

100" 300 TON HYDRAULIC WHEEL PRESS.

Distance between parallel bars, 100"; extreme distance between ram and head block, 81½"; diameter of ram, 14"; travel of ram, 20"; maximum working pressure, 5,000 lbs. per square inch; parallel bars, 2½" x 8" steel; triple plunger geared pump; 18" x 4" tight and loose pulleys, 400 revolutions; weight, 22,000 lbs.; floor space, 6' x 16'.

HYDRAULIC WHEEL PRESSES.

STANDARD 36" 100 TON PRESS WITH ONE PUMP.



FIG. 11501.

DESCRIPTION FIGS. 11501 TO 11503.

Cylinder and yoke are made of high grade iron, and cast in dry sand mold.

A ratchet device is attached to the yoke on all presses of over 130 tons capacity so that the same can be easily moved by one man.

Lining.—The cylinder lining is of a specially prepared iron, bored, turned and pressed into the cylinder, making it much superior to a brass or copper lining. On account of its hardness, the movement of ram does not wear it oblong as it would a brass or copper lining, thus causing a leakage, and in time necessitating either a new lining or the reboring of the old with the additional cost of a new ram, either way being expensive.

Pumps are made of the best phosphor bronze and have extra long eccentric rods, connection being made with pump by ball joint, which reduces the wear and friction to a minimum.

Tension bars are of the best quality of steel, the lower one set on edge, so as to give a bearing under its entire length, preventing the weight of yoke which travels on this bar from springing same.

Keys are of the same quality of steel as the tension bars with a large margin of safety, and are machined on bearing edges.

Traveling crane which holds axle or shaft for proper adjustment can be readily removed from carriage without removing bolt.

Steel facings.—The face of the ram and yoke, as well as all points of bearing on yoke and cylinder are faced with steel.

STANDARD 36" 60 TON PRESS ARRANGED FOR HAND POWER.

FIG. 11502.
267

HYDRAULIC WHEEL PRESSES.

DESCRIPTION FIGS. 11501 TO 11503.—Continued.

Packings are made from our own design, of the best leather procurable, and so constructed that they are self-tightening, making a perfectly tight and durable packing.

Fittings are of extra heavy steel.

Lock-up pressure gauge, pop safety valve and automatic valves are of the best as well as everything that goes into the makeup of our presses.

All presses are 8' 4" between face of ram and face of yoke. If more space is desired, an extra charge is made.

Each press is furnished with single pump. Double, triple or quadruple pumps can be supplied and are recommended except for the smaller sizes.

Pulleys run parallel to the tension bars, unless otherwise ordered; on all presses up to 150 tons, pulleys are 26" x 5"; on presses over 150 tons, 26" x 6".

Presses can be built to operate by hand power as shown in Fig. 11502 or by electric motor (see Fig. 11503) if so desired.

All presses built to take in standard length of American axle, unless otherwise specified.

Specifications on following page.

MOTOR DRIVEN 110" 500 TON PRESS WITH THREE PUMPS

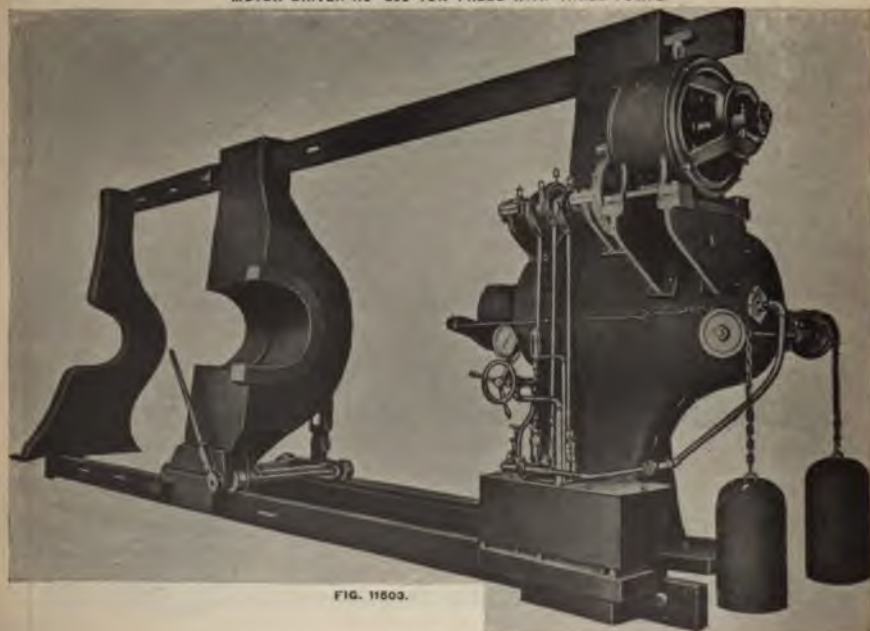


FIG. 11503.

HYDRAULIC WHEEL PRESSES.

Continued.

SPECIFICATIONS FIGS. 11601 TO 11603.

No.	Size of Wheel.	Distance Between Bars.	Power in Tons.	Measurement of Bars.	Opening in Yoke.	Weight, lbs.	Water Box.
1.....	36"	33"	30	14"	4½"	2,468	Gal. iron
2.....	36"	33"	40	14"	4½"	2,700	"
3.....	36"	40"	60	14"	4½"	4,715	Cast iron
4.....	36"	40"	80	15"	4½"	4,800	"
5.....	36"	40"	100	15"	6½"	6,430	"
6.....	36"	40"	125	15"	6½"	7,020	"
7.....	36"	40"	150	15"	6½"	7,820	"
8.....	36"	40"	175	15"	6½"	8,214	"
9.....	36"	40"	200	15"	9"	8,520	"
10.....	36"	40"	225	15"	9"	9,025	"
11.....	36"	40"	250	15"	9"	9,550	"
12.....	42"	47"	150	16"	7½"	9,617	"
13.....	42"	47"	175	16"	7½"	10,125	"
14.....	42"	47"	200	16"	9"	10,650	"
15.....	42"	47"	225	16"	9"	11,000	"
16.....	42"	47"	250	16"	9"	11,425	"
17.....	48"	54"	150	16"	8"	10,617	"
18.....	48"	54"	200	16"	9"	11,225	"
19.....	48"	54"	250	16"	9"	11,830	"
20.....	54"	60"	150	16"	8"	11,451	"
21.....	54"	60"	175	16"	8"	11,951	"
22.....	54"	60"	200	16"	9"	12,349	"
23.....	54"	60"	250	16"	9"	13,350	"
24.....	60"	66"	150	16"	8"	12,050	"
25.....	60"	66"	175	16"	8"	12,455	"
26.....	60"	66"	200	16"	9"	12,875	"
27.....	60"	66"	250	16"	9"	13,450	"
28.....	60"	66"	300	16"	9"	14,025	"
29.....	66"	72"	150	16"	9"	13,220	"
30.....	66"	72"	200	17"	9"	13,875	"
31.....	66"	72"	250	17"	9"	14,439	"
32.....	66"	72"	300	17"	9"	15,120	"
33.....	72"	78"	200	17"	9"	18,000	"
34.....	72"	78"	225	17"	9"	18,330	"
35.....	72"	78"	250	17"	9"	18,720	"
36.....	72"	78"	300	17"	9"	19,020	"
37.....	78"	84"	200	18"	9"	21,500	"
38.....	78"	84"	250	18"	9½"	22,125	"
39.....	78"	84"	300	18"	9½"	22,650	"
40.....	78"	84"	350	18"	9½"	23,172	"
41.....	84"	90"	250	18"	9½"	23,400	"
42.....	84"	90"	300	18"	9½"	24,000	"
43.....	84"	90"	350	18"	9½"	24,500	"
44.....	90"	96"	300	18"	9½"	24,720	"
45.....	90"	96"	350	18"	9½"	25,300	"
46.....	90"	96"	400	18"	9½"	26,720	"

*These dimensions are standard. Opening in yoke can be enlarged to suit requirements.

PLAIN CRANK PIN PRESS.



FIG. 11504.

Other sizes built to special order. As working conditions vary so much, rods are not included, and are made to order only.

DESCRIPTION FIG. 11504.

This cut shows our plain pattern of crank pin press, designed for forcing crank pins into locomotive driving wheels, forcing on and off balance wheels, crank disks, pulleys, gears, drums, etc. The operating mechanism is the same as in our best style of large horizontal jacks, in which the piston is inclosed, thus keeping foreign matter from the pump. The operator, when using it, stands close to the work and gauge. To a projection on the ram a chain is attached for easily forcing the ram back into the cylinder. The pump valves are large and fall on their seals, requiring no rush of water to seat them, and all parts are made so that they can be easily examined or repaired.

SPECIFICATIONS FIG. 11504.

Press.	Movement.	Weight.
60 ton.....	12"	950 lbs.
100 ton.....	12"	1,350 lbs.
125 ton.....	12"	1,600 lbs.
150 ton.....	12"	2,200 lbs.

PORTABLE HYDRAULIC CRANK PIN PRESS.

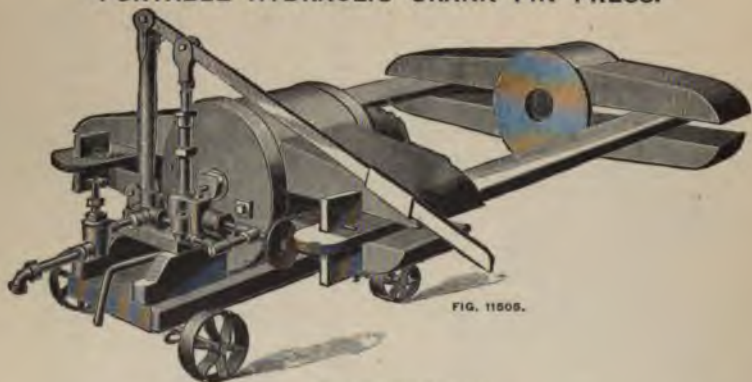


FIG. 11505.

DESCRIPTION FIG. 11505.

This press is a convenient machine for removing from and applying crank pins to the wheels of locomotives without removing the wheels, saving much valuable time, both in labor and the use of the engine; it is also useful in applying the shell liners to driving boxes, removing the piston rods from the head, and many other uses to which it can be put in a locomotive or general repair shop.

IMPROVED CRANK PIN PRESS.

DESCRIPTION FIG. 11506.

To avoid the tendency to force the crank pin out of true, which was the case in the older forms of crank pin presses when the beam is at the rear end of the machine, and acts as a weight with a leverage of the length of the press, this type of machine was devised, bringing the beam as close as possible to the work, and the placing of the pump close behind it with the lever at right angles to the line of the jack allows the operator to watch closely the work he is doing. All of the larger pieces of the machine are made of steel, in order to secure lightness. The very satisfactory working of the rack and pinion in our hydraulic punches and rail benders suggested the desirability of applying it to this tool, so that the loss of time caused in the older types by having to pump the ram out to working position can now be done away with, and at the same time a very satisfactory return motion is attained. We have retained the rack and pinion pump so satisfactorily used by us for the last few years upon this tool. The four sprocket wheels on the raising screws are, when sent out, connected with one chain which can, if desired, be placed upon them in pairs, or taken off entirely. The hydraulic gauge has

IMPROVED CRANK PIN PRESS.

DESCRIPTION FIG. 11506.—Continued.

one of our improved safety couplings to avoid the shock caused by the sudden releasing of pressure, and the working parts of the press are all of them easy of access for repairs or examination. The valves are situated directly beneath bonnets, fitted metal to metal, and require no packings.

	SIZES.		Weight, about.
	Movement.	Beam Length.	
60 ton.....	12"	28"	750 lbs.
60 ton.....	12"	42"	850 lbs.
100 ton.....	12"	41"	900 lbs.
100 ton.....	12"	48"	1,025 lbs.
125 ton.....	12"	40"	1,150 lbs.
150 ton.....	12"	42"	1,450 lbs.

The rods, chucks and pins are not included in the price of the machine, as the requirements for these are so variable. If height adjusting screws are not wanted, suitable allowance is made in the price.

A set of special railroad fittings for use with this press can be furnished if desired. Details will be furnished on application.

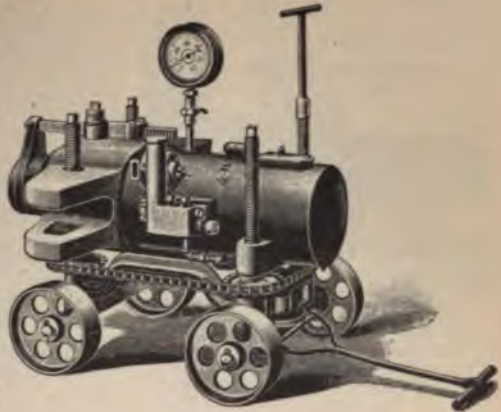


FIG. 11506.

DOUBLE PUMP PORTABLE CRANK PIN PRESS.

WITH REVERSING CYLINDER.

POWER, 250 TONS.

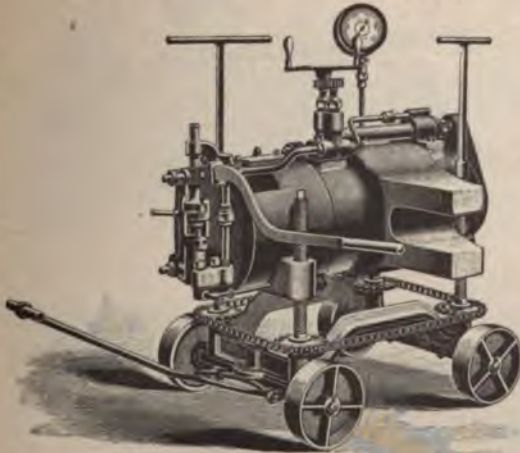


FIG. 11507.

DESCRIPTION FIG. 11507.

This tool, the most powerful portable shop tool which we have any knowledge of, was designed for engine shop work, where a variety of service is required. It is very complete, the large ram being operated by a double plunger pump; the low pressure piston drives it forward at four times the speed of the other and will give a maximum pressure of sixty tons. A small cylinder for withdrawing the large ram is located on top of the larger one, and the ram of this is connected to the larger one. A pair of geared screw valves throws the pump delivery to either the pressure or return cylinder, whichever is desired. The whole tool can be raised or lowered by the socket wrench placed on either of the four elevating screws at the corners, or, if it is desired, the chain may be taken off and each screw operated independently.

The beam and cylinder are made of steel and in one piece, in order to secure lightness.

The rod centers are adjustable, from 23" to 52", the diameter of the attaching rods being assumed at 4".

The center of large ram is adjustable vertically from 20" to 32".

Shipping weight is about 2,600 lbs.

HYDRAULIC T RAIL BENDER.

DESCRIPTION FIG. 11508.

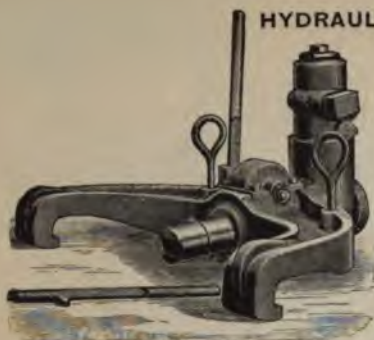


FIG. 11508.

Made in three sizes, as follows:

- No. 1. Weight 200 lbs., for 70 lb. 40 carbon rail.
- No. 2. Weight 275 lbs., for 90 lb. 40 carbon rail.
- No. 3. Weight 425 lbs., for 100 lb. 70 carbon rail.

This tool is one which we have recently added to our line of rail tools, and it has shown itself in use all that we expected (the most admirable tool for the purpose which has ever been produced). It is known that all the screw forms of this tool have not given satisfaction on the heavy rails, while it takes a gang of men to handle and work them and a space of several feet across the track to operate them. Also, they soon wear out and have to be replaced. This tool, while it weighs less, is not so clumsy to handle, and can be quickly applied and worked much easier by one operator. Our experiments have shown that it is not the method of bending, but the long spacing which sprung the rail so that a very heavy hook to catch the web was not necessary. In the tool the ram may be run in and out without pumping for a distance of $3\frac{1}{2}$ ft. This allows the tool to be placed over the rail and the ram brought up to its work on the rail head, when a few strokes will bend the rail to the desired curvature; it may then be slid along easily and another position given. The ram is graduated to show the spring of rail and has a loose steel head which fits the rail head. In a recent test in series two men bent forty 30' 90 lb. steel rails in one day, where previously twenty had been the best work of six men with the best of screw benders, and one rail was bent perfectly flat on 45' radius in $1\frac{1}{2}$ minutes, on 10' centers of application.

HYDRAULIC PORTABLE SHAFT STRAIGHTENER.

DESCRIPTION FIG. 11509.

This tool is designed for the straightening or bending of a shaft when on the center of a 24" lathe, or as a portable shop tool. The tool is mounted on wheels which are placed upon axles and between collars so that the gauge of the wheel can be made to suit the space between the V's of the lathes. A rack movement to the ram, ready access to all working parts, bronze pump, steel pinion shaft, and tool steel ram. The tool has a steel trussed girder bed, 25" long, $2\frac{1}{4}$ " from back of jaw to the center of the ram, and it will bend $3\frac{1}{2}$ " shaft easily.

The total height of the tool being 33"
Weight, 375 lbs.

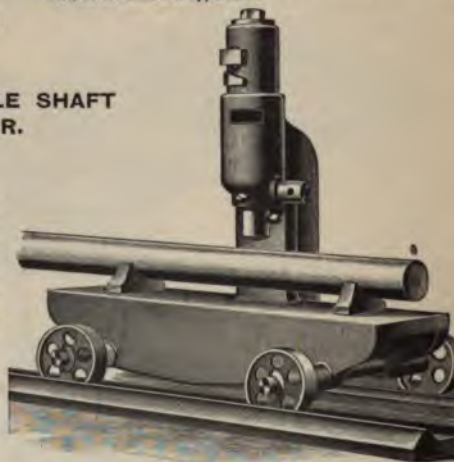


FIG. 11509.

NO. 1 MACHINE.

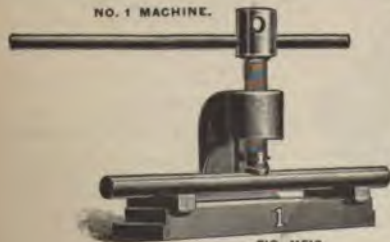


FIG. 11510.

STOCK AND SHAFTING STRAIGHTENING MACHINES.

DESCRIPTION FIGS. 11510 AND 11511

Figs. 11510 and 11511 represent our improved stock and shaft straightening machines. The screws are made of steel, the beds planed true, and have two steel V blocks fitted to slide on them, thus making it possible to accommodate work of any length.

STOCK AND SHAFTING STRAIGHTENING MACHINES.

DESCRIPTION FIGS 11510 AND 11511.—Continued.

Fig. 11511 shows No. 2 machine with centers, to take any length up to 30' attached. The same centers can be furnished with No. 1 machine. They are very convenient for testing a great variety of work, and can be made to order to take any length over 30' at an additional charge.

A light steel bar is placed in front of the centers for convenience in resting a pencil or piece of chalk when testing the work. The centers are always in line, easily adjusted without wrenches, and can be quickly removed from the machine when not wanted. No. 2 machine can be furnished with legs that fasten to the floor, as shown, or short legs can be substituted, making it suitable for bench use. No. 1 machine is intended for the bench only and is secured by lugs cast on each end of the bed. With each machine is furnished a finished steel bar for operating the screw.

SPECIFICATIONS.

	No. 1 Machine.	No. 2 Machine.
Will straighten shafts, diameter.....	1½"	2¼"
Length of bed.....	18"	20"
Weight of machine to mount on bench.....	60 lbs.	215 lbs.
Weight of machine with floor legs.....	.....	295 lbs.
Weight of centers.....	25 lbs.	25 lbs.

NO. 2. WITH CENTERS ATTACHED.



FIG. 11511.

NO. 3 STOCK AND SHAFT STRAIGHTENING MACHINE.

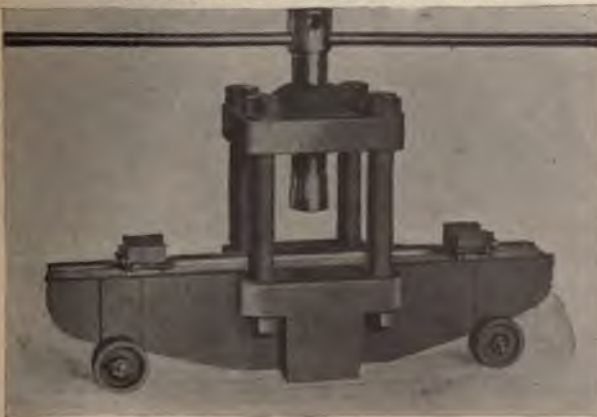


FIG. 11512.

DESCRIPTION FIG. 11512.

Our No. 3 machine will bend a shaft 5" in diameter. The bed is planed true for sliding V blocks, is 5' long, and is mounted on wheels which raise the bottom of the machine from the floor, so that it can be easily moved about should occasion require. The head for carrying the screw varies from the style of Nos. 1 and 2 machines, it being supported by four wrought iron posts, making it proof against fracture and capable of withstanding immense pressure. The V blocks are fitted with a device for testing the truth of the piece to be straightened without removing it from the machine. Weight, 1,750 lbs.

FOOT PRESSES.

NO. 0, STYLE A.



FIG. 11513.

No. 2, style A.—Capacity. This press is capable of cutting blanks $1\frac{1}{2}$ " diameter, $\frac{1}{8}$ " thick brass.

No. 2, style B.—This machine is fitted with a toggle joint connection very powerful in its action.

It is especially adapted to punching small holes in heavy stock, embossing, swaging, etc.

Capacity.—Will cut brass $\frac{1}{8}$ " thick, 2" diameter.

For specifications see following page.

DESCRIPTION FIGS. 11513 TO 11517.

No. 00, style A. Used for the lightest kind of punchings, such as paper and cardboard trimmings, light bending operations, etc.

Capacity.—Capable of cutting blanks $\frac{3}{4}$ " diameter, $\frac{1}{4}$ " thick brass.

No. 0, style A. Used for light punching, such as jewelry, button backs, suspender trimmings, etc.

Capacity.—Capable of cutting blanks $\frac{3}{4}$ " diameter, .05" thick brass.

No. 1, style A. Capacity.—This press is capable of cutting a blank 1" diameter, .08" thick brass.

NO. 1, STYLE A.



FIG. 11514.

No. 1 $\frac{1}{2}$, style A.—This press is of recent design, and is especially recommended to jewelers who wish a slightly heavier press than our No. 1A and desire to do very fine work. It is exceptionally well constructed in every particular.

Capacity.—This press is capable of cutting blanks $1\frac{1}{2}$ " in diameter up to No. 12 B. & S. brass, No. 13 B. & S. steel, by using shearing dies.

NO. 11-2 STYLE A.



FIG. 11515.

FOOT PRESSES.

Continued.

NO. 2. STYLE A.



FIG. 11516.

NO. 2. STYLE B.



FIG. 11517.

DESCRIPTION FIGS. 11513 TO 11517.—Continued.

The Nos. 60, 0, and 1 presses can be furnished without tables, to mount on bench, if so desired.

All presses are regularly furnished with cast iron levers, but steel levers can be supplied instead, at extra cost.

SPECIFICATIONS FIGS. 11513 TO 11517.

No. of Press	00A	0A	1A	1½A	2A	3B
Weight of press without legs	85 lbs.	140 lbs.	190 lbs.	.....	.....	.....
Weight of press with legs	160 lbs.	225 lbs.	335 lbs.	385 lbs.	600 lbs.	600 lbs.
Length of stroke	1¼"	1½"	1¾" and 2¼"	2"	1½" and 2"	1¼"
Hole in bed	1½"	2"	3"	2"	3" x 4½"	3¼" x 6½"
Greatest distance slide to platen	35½"	4"	55½"	6"	7"	5½"
Distance from center of plunger to back	2½"	3"	3½"	4"	4½"	3½"
Width of bed, front to back	45½"	5"	6"	7"	4¼"	5½"
Width of bed, right to left	9½"	10½"	11¾"	12"	15"	15"
Size of table	12" x 18"	13½" x 20"	15" x 23½"	16" x 24"	24" x 36"	25" x 24"
Floor space	19" x 22"	19" x 23"	24" x 24"	24" x 25"	30" x 36"	30" x 27"
Height over all	46½"	51"	60½"	60"	66"	63"
Weight with legs, domestic shipment	180 lbs.	250 lbs.	360 lbs.	410 lbs.	650 lbs.	550 lbs.
Weight with legs, foreign shipment	250 lbs.	325 lbs.	435 lbs.	500 lbs.	800 lbs.	675 lbs.
Weight for bench use domestic shipment	110 lbs.	180 lbs.	230 lbs.	.....	.....	.....
Weight for bench use, foreign shipment	160 lbs.	240 lbs.	300 lbs.	.....	.....	.....

ADJUSTABLE SCREW PRESSES.



FIG. 11818.

DESCRIPTION FIG. 11818.

This exceedingly convenient press is designed for use in machine shops for pressing shafts into and from pulleys, gear wheels, hubs, etc., and for straightening shafts. Its invention was the result of a constant need for such a press in our works, and we have one convenient to each of the lathes in our factory.

The engraving shows the construction and principle of operation of the machine very distinctly. From the table rise two screw guides, upon which the cross head is adjustably supported, having two semi-screw nuts and toggle mechanism by which the cross head is held fast or released for vertical adjustment. The cross head is balanced by weights, as shown, and a steadying bar connects the press cup with the press screw. On the press screw is fixed a spur toothed ratchet wheel embraced by a forked lever head fulcrumed to oscillate on the press screw. A double acting spring pawl engages the teeth of the ratchet, and to the press screw a hand crank is fixed.

After the object has been placed in press, the cross head in which the central screw is placed can be instantly dropped to the work, and with a few turns of the screw the required pressure is applied. An important saving in time is thus effected, as compared with the method heretofore followed of placing a quantity of blocks on the bed plate, or running a long screw up and down until it reached the material to be pressed.

The operator at a lathe can turn to the machine and press on or off any work that is done on mandrels in his lathe, avoiding the necessity of pounding on the ends of the mandrels, battering or spoiling the centers or springing the mandrels. The durability of mandrels thus used is indefinite, and the risk of breaking a wheel or other object in

putting it on or taking it off the mandrel is avoided. Moreover, pulleys or gear wheels pressed on shafts by this machine are more securely fixed, and less liable to be out of true when put into service.

We furnish this press in three sizes, as follows:

- No. 1. 12" x 24", capacity 20 tons pressure, weight 260 lbs.
- No. 2. 20" x 36", capacity 50 tons pressure, weight 870 lbs.
- No. 3. 30" x 36", capacity 50 tons pressure, weight 1,435 lbs.

SCREW PRESSES.

DESCRIPTION FIGS. 11819 TO 11821.

This screw press has many advantages that will be readily appreciated by any one familiar with this class of tools. The nut which receives the most wear is made in a separate casting, and bolted to the press body. These nuts are interchangeable and can be replaced at any time when worn out. The slide is extra long, and the bearing surfaces are hand scraped to insure perfect fit. The ways for the slide are solid with the press, which we consider a valuable improvement.

The stop or check nut instead of being threaded on the screw, as is common practice, is independent and threaded on the nut casting, a heavy shoulder on the screw bringing up against the check nut. This construction is clearly shown in the cut and is an important improvement.

Description continued on next page.



FIG. 11519.



FIG. 11521.

SCREW PRESSES.

Continued.

No. 1 HAND SCREW PRESS.

DESCRIPTION FIG. 11519.

This press is largely used for blanking and bending operations where power is not required, also for testing tools in the tool room.

Capable of cutting blanks $1\frac{1}{2}$ " diameter, $\frac{1}{16}$ " thick high brass.

Length of stroke.....	4 $\frac{1}{4}$ "
Greatest distance between slide and platen.....	8"
Distance from center of slide to back.....	3 $\frac{1}{4}$ "
Weight, net.....	450 lbs.
Weight, net, without table.....	335 lbs.
Weight, complete, domestic shipment.....	480 lbs.
Weight, complete, foreign shipment.....	600 lbs.
Floor space occupied.....	28" x 28"

No. 3, STYLE B, HAND SCREW PRESS.

DESCRIPTION FIG. 11520.

Used for camera trimmings, tool room work, etc.

Size of bed.....	16 $\frac{1}{2}$ " x 13"
Greatest distance between slide and bolster.....	16"
Distance from center of slide to back.....	6 $\frac{1}{2}$ "
Distance between die bolts, regular.....	10"
Weight, net.....	1,300 lbs.
Weight, domestic shipment.....	1,500 lbs.
Weight, foreign shipment.....	1,800 lbs.
Floor space occupied.....	40" x 40"

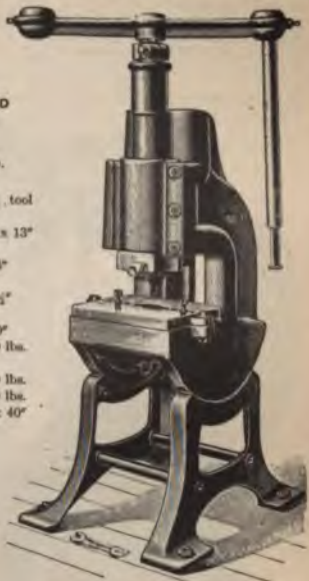


FIG. 11520.

No. 3 ARCH SCREW PRESS.

DESCRIPTION FIG. 11521.

This press is designed especially for tool room use in testing new dies; it is also used for manufacturing purposes on heavy work.

On heavy work, requiring considerable power, we insert one of our thrust bearings at the top of the machine to reduce the friction and take the thrust of the screw.

Strokes.....	7"
Distance from bottom of guides to bed.....	10"
Distance between uprights.....	15"
Width of bed.....	13"
Weight, net.....	1,700 lbs.
Weight, domestic shipment.....	2,000 lbs.
Weight, foreign shipment.....	2,500 lbs.

POWER PRESSES.

STYLE A, SINGLE ACTING POWER PRESSES.

DESCRIPTION FIGS. 11522 AND 11523.

The style A, or arch press, is designed with special reference to having the frame conform to the line of stress, which makes it preferable for all punching where the work is severe, as the die is set under the shaft and the strain is borne directly by the uprights. They are so constructed as to give a large die space, at the same time maintaining the strength.

The shafts are of forged steel, fitted with split bushings which are arranged to take up the wear on the under side of the shaft, thus always keeping it up to the upper side of the bearing, where it belongs.

The smallest size is often furnished for bench use, and can be so fitted when ordered.

The clutch used is our patent instantaneous clutch. The balance wheels are fitted with bronze bushings, and a combined hand and foot lever is furnished with each press.

NO. 5 GEARED PRESS WITH ROLL FEED ATTACHMENT.

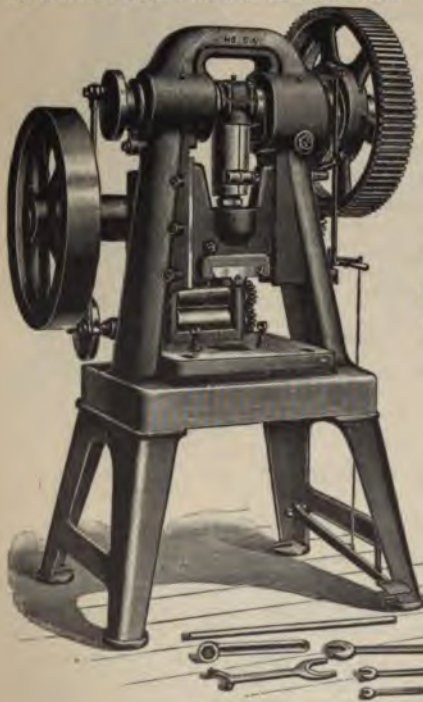


FIG. 11523.

(For description of roll feed see Fig. 11546.)

NO. 5 PLAIN PRESS.

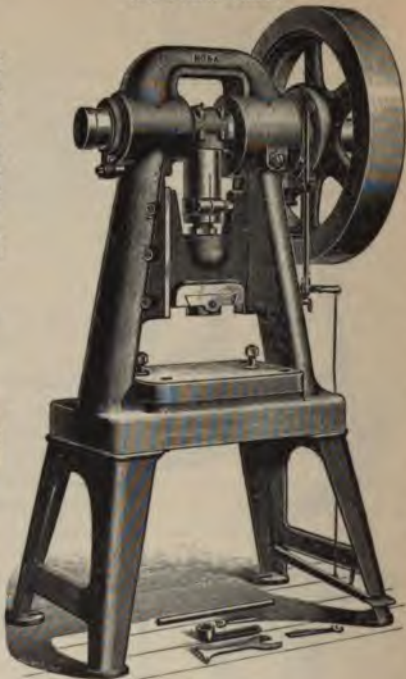


FIG. 11522.

These presses are fitted to receive bolster plates and dovetail chucks, both of which are furnished with each machine.

It is often advisable to use a geared power press on account of the larger range of work that can be produced with the same press, as a slow moving punch will penetrate a greater thickness of metal with less injury to the tools than if driven at a high rate of speed.

Where work is heavy, such as punching nuts, washers or sprocket work, we recommend a geared press; but where the metal is thin, a plain press is better suited to the work on account of the greater speed that can be obtained.

The gears are well proportioned, extra heavy and are cast from the best gun iron, both gear and pinion being cut from the solid metal.

The balance wheels are well proportioned and as large as they can be made and be consistent with the size of the body of the press.

For specifications see following page.

THE FAIRBANKS COMPANY

POWER PRESSES.
STYLE A, SINGLE ACTING PRESSES.
 SPECIFICATIONS FIGS. 11522 AND 11523.

No. of Press	1	2	3	4	5	7	8
Weight of press, geared					4,025 lbs.	12,000 lbs.	25,000 lbs.
Weight of press, plain	350 lbs.	625 lbs.	1,200 lbs.	2,100 lbs.	3,600 lbs.	9,000 lbs.	23,000 lbs.
Weight of flywheel, geared	50 lbs.	150 lbs.	300 lbs.	500 lbs.	800 lbs.	1,350 lbs.	3,400 lbs.
Weight of flywheel, plain					700 lbs.	1,800 lbs.	4,200 lbs.
Size of flywheel, geared	12" x 23 1/2"	18" x 31 1/2"	27" x 41 1/2"	30" x 41 1/2"	30" x 41 1/2"	42" x 71 1/2"	60" x 71 1/2"
Size of flywheel, plain					42" x 6"	60" x 7 1/2"	
Stroke, regular	1"	1"	1 1/2"	1 1/2"	2"	2"	2"
Stroke, longest	3/4"	1"	1 1/4"	1 1/4"	1 1/2"	2"	2 1/2"
Adjustment of slide	3/4"	1"	1 1/4"	1 1/4"	1 1/2"	2"	2 1/2"
Hole in bed, regular	1 1/2" x 2 1/2"	4" x 6 1/2"	6" x 9"	7 1/2" x 12 1/2"	8" x 13 1/2"	13" x 16"	20" x 28"
Hole in bed, largest	4" x 4"	6 1/2" x 7"	9" x 9"	10 1/2" x 12 1/2"	12" x 15"	20" x 30"	30" x 30"
Distance between uprights	6"	9"	12"	16"	22"	30"	42"
Distance from slide to bolster with slide down and adjustment up	4 1/4"	4 3/4"	5 3/4"	6 1/4"	7 1/2"	9"	13"
Size of bottom of slide	2 1/4" x 2 1/4"	3" x 4 1/2"	3 1/2" x 6 1/4"	4 1/2" x 9"	5 1/4" x 10"	9 1/2" x 15"	14" x 19"
Thickness of bolster plate	1"	1"	1 1/2"	2"	2 1/4"	4"	4 1/2"
Distance between die bolts	4 1/2"	7 1/2"	10"	13 1/2"	18 1/2"	Slots	Slots
Width of bed, front and back	9 1/4"	13"	15 1/4"	18"	23"	31"	44"
Width of bed, right to left	12"	16"	21 1/4"	27"	33 1/2"	31 1/2"	39"
Speed of press, plain, revolutions	200	150	100	120	100	80	60
Speed of press, geared, revolutions					24	18	15
Floor space	10' x 23'	10 1/2' x 20'	23 1/2' x 20'	26' x 30'	32' x 42 1/2'	68' x 46'	70' x 120'
No. of countershaft	2	2	3	3	4	5	Special
Size of tight and loose pulleys	12" x 3"	12" x 3"	14" x 4"	16" x 4"	24" x 5"	28" x 6"	30" x 7"
Size of driving pulley on countershaft	12" x 3"	12" x 3"	14" x 4"	16" x 4"	20" x 6"	24" x 7"	26" x 8"
Capacity in high brass	5/8" x 3/4"	5/8" x 3/4"	5/8" x 3/4"	5/8" x 4"	5/8" x 6"	1 1/2" x 5"	1 1/2" x 5"
Height over all	57"	57"	57"	67"	73"	84"	103"
Proportion of gearing					1 to 5	1 to 5	1 to 5

STYLE A, DOUBLE ACTING POWER PRESSES.
 DESCRIPTION FIG. 11524.

Where it is desirable to obtain in one stroke of the press a cutting and drawing operation, double acting presses are generally used; that is, where the work is not so deep as to require a blank holder.

No. of Press	2	3	4	5
Weight of press, geared				4,025 lbs.
Weight of press, plain	625 lbs.	1,200 lbs.	2,100 lbs.	3,600 lbs.
Weight of flywheel, geared				800 lbs.
Weight of flywheel, plain	150 lbs.	300 lbs.	500 lbs.	700 lbs.
Size of flywheel, geared	18" x 31 1/2"	27" x 41 1/2"	30" x 41 1/2"	30" x 41 1/2"
Size of flywheel, plain				42" x 6"
Cutting stroke	1"	1"	1"	1 1/2"
Drawing stroke	1 1/2"	2"	2 1/4"	2 1/2"
Adjustment of cutting slide	3/4"	3/4"	3/4"	3/4"
Adjustment of drawing plunger	3/4"	3/4"	3/4"	3/4"
Hole in bed (regular)	4" x 6 1/2"	6" x 9"	7 1/2" x 12 1/2"	8" x 13 1/2"
Hole in bed (largest)	6 1/2" x 7"	9" x 9"	10 1/2" x 12 1/2"	12" x 15"
Distance between uprights	9"	12"	16"	22"
Distance from cutting slide to bolster with stroke down and adjustment up	3 3/4"	5 1/4"	6 3/4"	7 1/2"
Distance from drawing plunger to bolster with stroke down and adjustment up	5 1/2"	7 3/4"	9 3/4"	10 1/2"
Size of bottom slide	3" x 4 1/2"	3 1/2" x 6 1/4"	4 1/2" x 9"	5 1/4" x 10"
Thickness of bolster	1"	1 1/2"	2"	2 1/4"
Distance between die bolts	7 1/2"	10"	13 1/2"	18 1/2"
Size of bed, front and back, right and left	13" x 16"	15 1/4" x 21 1/4"	18" x 27"	23" x 33 1/2"
Floor space	10 1/2' x 20'	23 1/2' x 20'	26' x 30'	32' x 42 1/2'
Speed of press, geared, revolutions	150	130	120	100
Speed of press, plain, revolutions				24
No. of countershaft	2	3	4	5
Size of tight and loose pulleys	12" x 3"	14" x 4"	16" x 4"	24" x 5"
Size of driving pulley on countershaft	12" x 3"	14" x 4"	16" x 4"	20" x 6"
Will punch and draw in soft brass	3/8" x 3/8"	3/8" x 3/8"	1 1/2" x 3 1/4"	2 1/4" x 1"
Height over all	57"	57"	57"	67"
Ratio of gearing				1 to 5

Note: Cut shows No. 3 plain press fitted with roll feed attachment. For description of feed attachments, see Figs. 11546 to 11548.

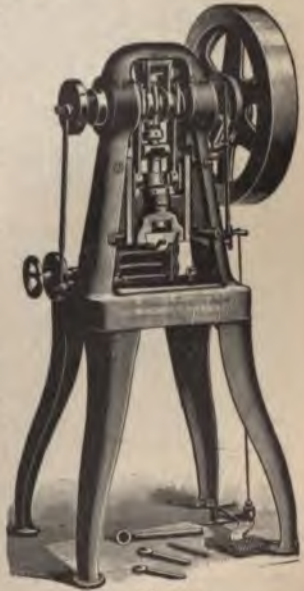


FIG. 11524.

POWER PRESSES.

STYLE P. A



FIG. 11525.



FIG. 11527.



FIG. 11526.



FIG. 11528.

SPECIFICATIONS FIGS. 11525 TO 11528.

No. of Press.....	1	2	3	4	5	6	7	8	9
Weight, plain.....	250 lbs.	800 lbs.	1,500 lbs.	2,000 lbs.	3,000 lbs.	3,500 lbs.	6,500 lbs.	8,500 lbs.	
Weight, geared.....	1,000 lbs.	1,800 lbs.	2,500 lbs.	3,800 lbs.	4,500 lbs.	8,000 lbs.	10,000 lbs.	12,000 lbs.	14,000 lbs.
Opening in bed.....	3" H	5" x 6"	6½" x 8"	7½" x 9½"	8½" x 10"	9" x 12"	10" x 12"	12" x 14"	12" x 14"
Distance from bed to slide, when up.....	0"	4½"	5½"	6"	6½"	7"	8"	8"	8"
Distance back from center of slide.....	5"	5½"	7"	9"	10"	12"	12"	14"	14"
Distance between standards.....	1"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"
Stroke of plunger (standard).....	1½"	1"	1"	1"	1"	1"	1"	1"	1"
Adjustment of plunger.....	14" x 23½"	20" x 31½"	24" x 4"	28" x 5"	32" x 5½"	34" x 6"	36" x 6½"	40" x 8"	40" x 8"
Size of balance wheel.....	75 lbs.	160 lbs.	250 lbs.	350 lbs.	575 lbs.	675 lbs.	900 lbs.	1,200 lbs.	1,500 lbs.
Speed of balance wheel.....	175	125	100 to 125	100	75 to 100	75 to 100	300	300 to 360	300 to 360
Area of bolster plate.....	12" x 6"	8" x 11"	10" x 15"	14" x 19"	14" x 20"	16" x 24"	18" x 24"	18" x 29"	18" x 29"
One bolster plate furnished with press, thickness.....		1"	1½"	1½"	1½"	2½"	2½"	2½"	2½"
Hole in plunger, round.....	¾"	1"	1½"	1½"	1½"	1½"	1½"	1½"	1½"
Geared presses, diameter of gear.....		20"	24"	28"	33"	36"	38"	40"	40"
Proportion of gearing.....		4 to 1	4½ to 1	5 to 1	5 to 1	5 to 1	5 to 1	5 to 1	10 to 1
Size of pulley.....		14" x 3½"	16" x 3½"	18" x 4"	22" x 6"	24" x 6"	24" x 6"	24" x 6"	24" x 6"
Capacity of plain, punching round blanks from machinery steel.....		3½"	5½"	3½"	8½"	8½"	8½"	8½"	8½"
Capacity of geared press, round blanks.....		1½"	4½"	2½"	4½"	4½"	4½"	4½"	4½"
Capacity of geared press, round blanks.....		4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"
Floor space.....	10" x 12"	28" x 30"	28" x 32"	28" x 30"	24" x 24" 6"	34" x 40"	36" x 48"	36" x 48"	36" x 48"

INCLINABLE POWER PRESSES.

NO. 10.

THE FAIRBANKS COMPANY



FIG. 11529.



FIG. 11530.

DESCRIPTION FIGS. 11529 AND 11530.

Standard incline power presses are built in four sizes, ranging in weights from 750 lbs. to 6,500 lbs. inclusive. The general dimensions in the construction are such that dies previously used in any modern type press are interchangeable. The workmanship is of the best and the materials are of the highest grade obtainable.

Some of the distinct features of the press are the exceptionally long gib bearings, extra heavy forged steel crank shafts, simple and effective brake friction, accurate adjustments of stroke and absolutely positive instantaneous clutches.

Clutches.—We furnish these presses with several types of clutches and among them are the sliding bar, rolling pin, and the "Horton" roller friction clutch. This last clutch engages at any point instantly; in fact, there is less than $\frac{1}{8}$ " travel on the periphery of the flywheel from the time the treadle is depressed until crank shaft is revolving. There are usually nine distinct points which connect simultaneously thereby giving an almost solid connection from the face of the flywheel to the center of crank shaft. The clutch also disengages instantly and with as little effort as it engages.

Positive stop.—All our clutches are provided with a positive stop which prevents the crank shaft from making a second revolution. Should it be desired to run the press continuously by holding the treadle down successive strokes may be had by sliding the positive stop out of position.

Treadle lock.—We furnish a treadle lock with each press without extra charge.

Knockout.—A positive knockout attachment is furnished in each press of this style for discharging the work from the upper die, without extra charge.

Friction or brake is of the "Tong" type. It is attached to the frame of press and works on a collar attached to the end of crank shaft. Crank shaft is of special forged steel and is extra large in diameter.

Lubrication appliances.—The crank shaft bearings are provided with compression grease cups in which we advise the use of crude petroleum.

Bronze bushings are used in all flywheels.

Adjusting nuts are in all presses of this type case hardened.

Cam actuated knockout is furnished when desired at extra cost.

Strokes.—Any length of stroke within limits is furnished to meet requirements at a small additional cost.

Gearing.—All sizes of this type of press are built geared in suitable ratios depending wholly upon the nature of the work whether it is heavy stamping, deep light drawing, or reducing.

Feeds and gauges.—Upon request, if necessary information is sent, we will submit specifications and prices of special feeds and gauges and at all times prices on our regular feeds, such as single and double roll, dial, finger, and hopper feeds.

Stay rods.—Although our presses are very heavily reinforced in the gap, we sometimes furnish in the larger sizes, when required, stay rods to permit of heavier work than is regularly given as the press's capacity.

Motor driven presses.—We will furnish presses on motor driven presses upon receipt of full information giving kind and amount of power used.

INCLINABLE POWER PRESSES.

DESCRIPTION FIGS. 11529 AND 11530.

Continued.

DIMENSIONS NO. 7 STANDARD.	
Weight complete.....	750 lbs.
Standard opening in bed.....	6"
Largest possible opening in bed, front and back, right and left.....	4½" x 8"
Distance back from center of slide.....	4"
Width of opening in back of frame.....	7"
Width between gibs.....	4"
Distance bed to slide, stroke and adjustment up, standard stroke.....	7¼"
Standard stroke of slide.....	1½"
Maximum.....	
Adjustment of slide.....	1¾"
Diameter of balance wheel.....	21"
Width of face of balance wheel.....	3¼"
Weight of balance wheel.....	150 lbs.
Speed of balance wheel, revolutions per minute....	100-150
Area top of bolster plate, front and back, right and left.....	8½" x 14"
Thickness of bolster plate.....	1¾"
Height to center of shaft.....	51"
Floor space over all.....	31" x 25"

DIMENSIONS NO. 9 STANDARD.	
Weight complete.....	2,200 lbs.
Standard opening in bed.....	10"
Largest possible opening in bed, front and back, right and left.....	9" x 12"
Distance back from center of slide.....	6"
Width of opening in back of frame.....	9"
Width between gibs.....	5¾"
Distance bed to slide, stroke and adjustment up, standard stroke.....	8"
Standard stroke of slide.....	2"
Maximum.....	
Adjustment of slide.....	2½"
Diameter of balance wheel.....	34"
Width of face of balance wheel.....	5¼"
Weight of balance wheel.....	500 lbs.
Speed of balance wheel, revolutions per minute....	100-150
Area top of bolster plate, front and back, right and left.....	13" x 21"
Thickness of bolster plate.....	1¾"
Height to center of shaft.....	61"
Floor space over all.....	42" x 33"

DIMENSIONS NO. 8 STANDARD.	
Weight complete.....	1,300 lbs.
Standard opening in bed.....	7"
Largest possible opening in bed, front and back, right and left.....	5" x 9"
Distance back from center of slide.....	4"
Width of opening in back of frame.....	8"
Width between gibs.....	5"
Distance bed to slide, stroke and adjustment up, standard stroke.....	7¼"
Standard stroke of slide.....	2"
Maximum.....	
Adjustment of slide.....	2¾"
Diameter of balance wheel.....	28"
Width of face of balance wheel.....	3¾"
Weight of balance wheel.....	250 lbs.
Speed of balance wheel, revolutions per minute....	100-150
Area top of bolster plate, front and back, right and left.....	9½" x 17½"
Thickness of bolster plate.....	1½"
Height to center of shaft.....	56½"
Floor space over all.....	37" x 29"

DIMENSIONS NO. 10 STANDARD.	
Weight complete.....	3,000 lbs.
Standard opening in bed.....	14"
Largest possible opening in bed, front and back, right and left.....	12" x 16"
Distance back from center of slide.....	9"
Width of opening in back of frame.....	13"
Width between gibs.....	7¼"
Distance bed to slide, stroke and adjustment up, standard stroke.....	10"
Standard stroke of slide.....	2"
Maximum.....	
Adjustment of slide.....	2½"
Diameter of balance wheel.....	36"
Width of face of balance wheel.....	5¼"
Weight of balance wheel.....	750 lbs.
Speed of balance wheel, revolutions per minute....	75-125
Area top of bolster plate, front and back, right and left.....	18½" x 27"
Thickness of bolster plate.....	2½"
Height to center of shaft.....	62"
Floor space over all.....	50" x 36"

THE FAIRBANKS COMPANY

ADJUSTABLE POWER PRESSES.

NO. 30A PLAIN PRESS.



FIG. 11531.

STYLE P. E.

NO. 30H PLAIN PRESS.



FIG. 11532.

NO. 40 PLAIN PRESS.



FIG. 11533.

DESCRIPTION FIGS. 11531 TO 11533.

These presses are of such a familiar type that much description is unnecessary. They are extensively used by all manufacturers of sheet metal goods. The whole body of the machine may be inclined to any desired angle. Presses are built in the plain fly wheel type as shown above, or, if more power is desired, they can be heavily geared. Each machine is supplied with bolster plate and treadle. Dies are furnished at extra cost only.

SPECIFICATIONS.

No. of Press.	10	20	30	50A	30H	40	50	60	70
Weight, complete, about...	500 lbs.	600 lbs.	800 lbs.	1,300 lbs.	1,600 lbs.	2,300 lbs.	3,500 lbs.	5,200 lbs.	7,500 lbs.
Opening in bed, round.....	4"	5"	6"	7"	8"	10"	14"	14"	26"
Distance back from center of slide.....	3"	4"	4½"	4½"	6"	6"	9"	9"	15"
Distance between standards	4"	7"	7½"	8"	9"	10"	13"	13"	26"
Distance from bed to bottom of slide, when stroke and adjustment are up....	6"	7"	7½"	7½"	7½"	8½"	9"	10"	11"
Stroke of plunger, standard....	1"	1½"	1½"	2"	2"	2"	2½"	2½"	2½"
Adjustment of plunger.....	½"	1"	2"	2½"	2½"	2½"	3"	3"	3½"
Diameter of balance wheel....	18"	20"	22"	26"	26"	34"	36"	42"	48"
Width of balance wheel....	2½"	3"	3½"	3½"	3½"	5½"	5½"	5½"	6"
Weight of balance wheel....	75 lbs.	125 lbs.	160 lbs.	250 lbs.	260 lbs.	500 lbs.	750 lbs.	900 lbs.	1,300 lbs.
Speed of balance wheel....	125	125	125	125	125	100	100	75	50 to 75
Area of bolster plate.....	6" x 10"	8" x 13"	9" x 14"	9" x 17"	12" x 18"	13" x 21"	15" x 23"	16" x 23"	33" x 33"
Thickness of bolster plate....	1"	1"	1¼"	1½"	1½"	2½"	2½"	3"	3¼"
Hole in bolster plate, round furnished.....	1"	2"	3"	3"	3"	4"	5"	6"	18"
Hole in plunger, standard....	¾"	1"	1½"	1½"	1½"	1½"	1½"	1½"	1½"
Area of plunger, standard....	3" x 4"	4½" x 5"	5" x 5"	5" x 6"	5" x 6"	6" x 7"	6" x 11"	10" x 12"	14" x 16"

POWER PRESSES.

NO. 5 GEARED PRESS.
SHOWN WITH TIE BOLTS, OR STAY RODS.

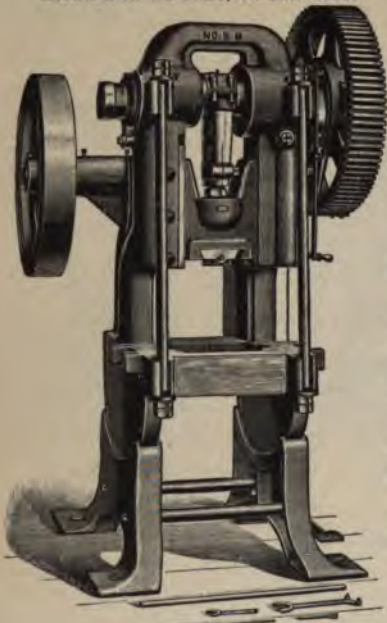


FIG. 11534.

STYLE B, SINGLE ACTING POWER PRESSES.

DESCRIPTION FIG. 11534.

This press was designed to meet a demand for an open back tilting press which could produce a large variety of work, and which could be inclined, permitting work to slide from the die by gravity, thus answering the purpose of a knockout motion, and not increasing its cost and complication.

These presses have large die space, and their overhang construction with open back permits the stock to be fed from front to back or sideways, as desired, as the feed rolls can be placed on either side or on the back of the die.

The body of the press is very heavy in comparison with those of other makes of equal size, and the shaft and bearing are simply large for the work required.

The ball and socket adjustment is used on the connection unless otherwise ordered. Shafts are of forged steel, fitted with bushings.

Our patent instantaneous clutch and stop motion is used. Balance wheels are fitted with bronze bushings, and a combined hand and foot trip is furnished with each press. Tie rods can be furnished if required, but it is advisable to select a press large enough for the work without their use.

In the upright position these presses are used for blanking out all work that can be passed through the dies, with either plain or combination dies and punches, and when inclined are adapted to combination dies, or any style of die work where the work should slide from the die by gravity.

Experience has shown that the press should be inclined from 38° to 40° to produce the best results. Symmetry of design as well as utility has been considered in the design of these presses, the stock having been placed to give the greatest strength with the least amount of metal.

The larger sizes can be furnished either plain or geared.

SPECIFICATIONS.

NO. OF PRESS.	1	2	3	4	5	7
Weight of press, geared.....	400 lbs.	875 lbs.	1,550 lbs.	2,600 lbs.	5,000 lbs.	10,800 lbs.
Weight of press, plain.....					4,575 lbs.	10,200 lbs.
Weight of flywheel, geared.....	50 lbs.	150 lbs.	300 lbs.	500 lbs.	500 lbs.	820 lbs.
Diameter of flywheel, geared.....	12"	18"	27"	30"	30"	36"
Diameter of flywheel, plain.....					42"	42"
Face of flywheel, geared.....	2 1/4"	3 1/4"	4 1/2"	4 1/2"	4 1/2"	5 1/2"
Face of flywheel, plain.....	1"	1"	1 1/2"	1 1/2"	2"	2"
Stroke, regular.....	13"	13"	13"	13"	13"	13"
Stroke, longest.....	14 1/2"	14 1/2"	14 1/2"	14 1/2"	14 1/2"	14 1/2"
Adjustment of slide.....	3/4"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Hole in bed, regular.....	1 1/2" x 2 1/4"	4" x 6 1/4"	6" x 9"	7 1/2" x 12 1/4"	8" x 13 1/4"	10" x 10 1/2"
Hole in bed, largest possible, extra.....	4" x 4"	6 1/2" x 7"	9" x 9"	10 1/2" x 12 1/2"	12" x 15"	12" x 15"
Distance between housings or uprights.....	5"	7"	8 1/2"	11"	14 1/4"	18"
Distance from center of slide to back.....	3 1/2"	4 1/4"	5 1/2"	6"	7"	8"
Thickness of bolster plate.....	1"	1 1/2"	1 1/2"	2"	2"	3 1/2"
Distance between die bolts, regular.....	4 3/4"	7 1/4"	10"	13 1/2"	18 1/2"	Slots
Distance from slide to bolster with stroke down and adjustment up.....	4 3/4"	4 3/4"	5 3/4"	6 3/4"	8"	8"
Size of bottom of slide.....	2 1/4" x 2 1/4"	3" x 4 1/4"	3 1/2" x 6 1/4"	4 1/2" x 9"	5 1/4" x 10"	7 1/2" x 13 1/2"
Width of bed, front to back.....	9"	11 1/2"	14"	16 1/2"	19 1/2"	26"
Width of bed, left to right.....	11"	15"	15 1/4"	19"	23 1/2"	32 1/2"
Floor space, regular.....	24" x 30"	25" x 28"	26 1/2" x 30"	28" x 34"	33 1/2" x 38"	60" x 60"
Speed of press, plain, revolutions.....	200	150	130	120	100	90
No. of countershaft.....	2	2	3	4	5	Special
Size of tight and loose pulleys.....	12" x 2"	12" x 3"	14" x 4"	16" x 4"	24" x 5"	26" x 5"
Size of driving pulley on countershaft.....	12" x 2"	12" x 3"	14" x 4"	16" x 4"	20" x 6"	24" x 6"
Capacity in high brass, round blanks.....	3/8" x 3/4"	3/8" x 3/4"	3/8" x 3/4"	3/8" x 7/8"	1/2" x 6"	1/2" x 9"
Height over all.....	53"	57"	67"	70"	84"	87"
Proportion of gearing.....					1 to 5	1 to 5

POWER PRESSES.

STYLE B, DOUBLE ACTING POWER PRESSES.

DESCRIPTION FIG. 11535.

The style B double acting presses are identical with the style A, shown in Fig. 11524, as far as capacity is concerned, but they are adapted to a far wider range of work, as they can be inclined and the work pass from the top of the die by gravity, and thus allow the use of the dies that would require the work to be removed by hand or knockout motion if used in a style A press.

The feed rolls can also be placed on the side of the press for using stock in short lengths.

Each press is furnished with one plain bolster plate, also treads and stay bolts. No dies are supplied except at extra cost. Press may be either of the plain flywheel type, as shown, or, if more power is desired, it can be heavily geared.

For description of feeding devices applicable to this press see page 292, Figs. 11546 to 11548.

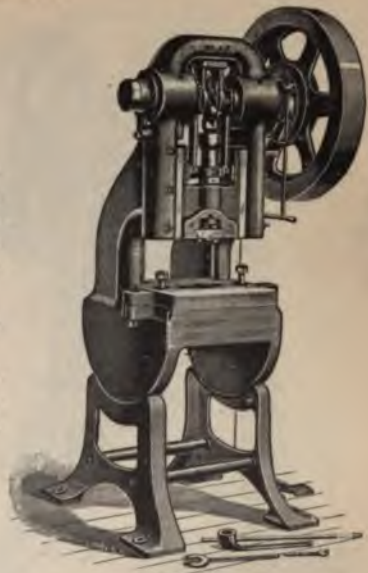


FIG. 11535.

SPECIFICATIONS FIG. 11535.

No. of press.....	2	3	4	5
Weight of press, geared.....				5,000 lbs.
Weight of press, plain.....	875 lbs.	1,550 lbs.	2,600 lbs.	4,575 lbs.
Weight of flywheel, geared.....				500 lbs.
Weight of flywheel, plain.....	150 lbs.	300 lbs.	500 lbs.	700 lbs.
Diameter of flywheel, geared.....				30"
Diameter of flywheel, plain.....	18"	27"	30"	42"
Face of flywheel, geared.....	3 1/4"	4 1/8"	4 3/8"	4 1/2"
Face of flywheel, plain.....	1"	1 1/2"	1 1/2"	6"
Cutting stroke.....	13 1/2"	2"	2 1/4"	1 1/4"
Drawing stroke.....	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Adjustment of cutting slide.....	4" x 6 1/2"	6" x 9"	7 1/2" x 12 1/2"	8" x 13 1/2"
Adjustment of drawing plunger.....	6 1/2" x 7"	9" x 9"	10 1/2" x 12 1/2"	12" x 15"
Hole in bed, regular.....	7"	8 1/2"	11"	14 1/2"
Hole in bed, largest possible, extra.....				
Distance from cutting plunger to bolster with stroke down and adjustment up.....	3 3/4"	5 1/2"	6 1/4"	8"
Distance from drawing plunger to bolster with stroke down and adjustment up.....	5 1/2"	7 1/4"	9 1/2"	10 1/2"
Size of bottom of slide.....	3 1/2" x 4 1/4"	3 1/2" x 6 1/4"	4 1/2" x 9"	5 1/2" x 10"
Distance from center of slide to back.....	4 1/2"	5 1/2"	6"	7"
Thickness of bolster plate.....	1"	1 1/2"	2"	2"
Distance between die bolts, regular.....	7 1/4"	10"	13 1/2"	18 1/2"
Width of bed, front to back.....	11 1/2"	14"	16 1/2"	19 1/2"
Width of bed, left to right.....	13"	15 1/2"	19"	23 1/2"
Floor space, regular.....	25" x 28"	36 1/2" x 30"	28" x 34"	33 1/2" x 38"
Speed of press, plain, revolutions.....	130	130	120	100
No. of countershaft, extra.....	2	3	4	5
Size of tight and loose pulleys.....	12" x 3"	14" x 4"	16" x 4"	24" x 5"
Size of driving pulley on countershaft.....	12" x 3"	14" x 4"	16" x 4"	20" x 6"
Will punch and draw in soft brass.....	5/8" x 1/2" x .02"	3/4" x 1/2" x .04"	1 1/2" x 3/4" x .062"	2 1/4" x 1" x .062"
Height over all.....	57"	67"	70"	84"
Proportion of gearing.....				1 to 5

THE FAIRBANKS COMPANY

CAM POWER PRESSES.

NO. 5, STYLE A, CAM PRESS.



FIG. 11536.

Shown with cam movement on central plunger.

DESCRIPTION FIGS. 11536 AND 11537.—Continued.

The cam motion can be applied to either central plunger or slide. Shafts have central support to prevent springing. Roller bearings are applied to the cam rolls, and the cams and rolls are hardened tool steel. This obviates the trouble so often experienced of heating and roughing up, and allows the press to run continuously.

Cam presses can be supplied in either our style A or style B, and specifications are in general the same as given for Figs. 11522 and 11534.

Feeding attachments as shown in Figs. 11546 to 11548 can be supplied for these machines if desired.

DESCRIPTION FIGS. 11536 AND 11537.

Cam presses are designed for blanking and cupping shell work the stock being cut and drawn in one stroke of the press. The advantage of the cam over the crank double acting press lies in the fact that the plunger dwells longer on the blank during the operation of drawing, and also in the increased length of stroke which can be obtained.

NO. 5, STYLE B, CAM PRESS.

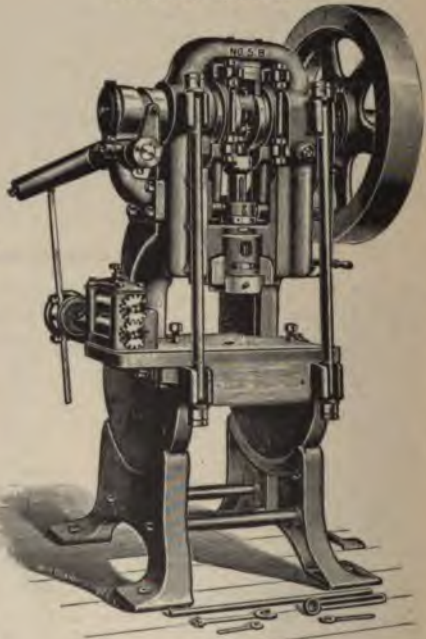


FIG. 11537.

Shown with cam movement on slide and press equipped with rack roll feed, arranged to feed from side to side.

POWER PRESSES.

STYLE C POWER PRESSES.

NO. 1 PRESS.

DESCRIPTION FIGS. 1028 AND 1029.

These presses were designed to meet the needs of manufacturers of small articles of hardware, sheet metal, optical goods, and to take the place of a small hand screw or hot press.

The base is cast with a large opening and the smaller size has a drawer to hold the work when finished. All bearings are adjustable for wear, the slide having a particularly long bearing surface, ground to entire length.

The frame is cast for the slide with a series of sections. These sections and the grooves in the slide, as illustrated, are fitted with hard anti-friction metal, the grooves preventing the slide from turning.

The adjustment of the plunger is made by an eccentric with changing collar. This adjustment does not affect the length of stroke, but is used for adjusting the slide for size of different thicknesses.

Our regular patent instantaneous clutch and stop motion is provided, by the use of which the press can be run continuously or stopped at each revolution, as the work may require.

Presses are furnished with a table or may be used for bench if desired. Foot trip only is furnished with the smallest size of this style of press.



FIG. 1028.

NO. 2 PRESS.

SPECIFICATIONS FIGS. 1028 AND 1029.



FIG. 1029.

	No. 1	No. 2
Weight of press.....	220 lbs.	100 lbs.
Weight of press with legs.....	300 lbs.	150 lbs.
Weight of balance wheel.....	80 lbs.	100 lbs.
Size of balance wheel.....	14" x 2"	10" x 1 1/2"
Stroke, regular.....	1"	1"
Stroke, longest.....	1 1/2"	1"
Adjustment of stroke.....	3/4"	3/4"
Hole in bed, regular.....	.....	2" x 6 1/2"
Hole in bed, largest possible.....	4 1/2"	7" x 7"
Hole in bolster, stroke up, adjustment down.....	3 1/2"	6 1/2"
Distance from center of slide to back.....	4"	3 1/2"
Size of bottom of slide.....	2 1/2" diameter	2 1/2" square
Distance between die bolts.....	7 1/2"	7 1/2"
Width of bed, front and back.....	7"	10"
Width of bed, right to left.....	12"	11 1/2"
Thickness of bolster plate.....	.....	1"
Bench space.....	17" x 10"	.....
Floor space, with legs.....	20" x 20"	20" x 20"
Height over all.....	22"	.....
Height over all, with legs.....	32"	40"
Speed of press, revolutions.....	300	200
Capacity of high brass.....	1/2" diameter 1/4" thick	1 1/4" diameter 1/4" thick

POWER PRESSES.

NO. 1 PLAIN STRAIGHT SIDED PRESS.



FIG. 11540.

NO. 1 PLAIN STRAIGHT SIDED PRESS WITH SPECIAL ROUND BED.



FIG. 11540A.

NO. 7 GEARED STRAIGHT SIDED PRESS.

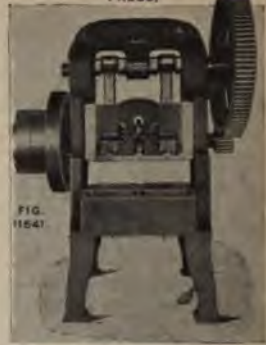


FIG. 11541.

NO. 6 STRAIGHT SIDED GEARED PRESS WITH SPECIAL ROUND BED.



FIG. 11541A.

SPECIFICATIONS FIGS. 11540 TO 11541A.

Number of Press	1	2	3	4	5	6	7	8	9	10	20	
Weight, plain, lbs.	1,800	2,400	3,500	4,000	4,500	5,200	6,000	7,600	9,000	11,000	14,000	26,000
Weight, geared, lbs.	2,300	3,000	4,200	4,700	5,200	6,000	7,000	8,600	10,000	12,000	16,000	30,000
Distance from bed to slide, when up.	8"	8"	10"	10"	12"	12"	12"	12"	12"	12"	12"	16"
Opening in bed.	8" x 16"	10" x 20"	12" x 24"	12" x 28"	14" x 30"	16" x 32"	18" x 36"	20" x 40"	22" x 42"	22" x 48"	24" x 64"	
Distance between standards.	30"	24"	30"	34"	36"	38"	42"	48"	54"	60"	66"	96"
Stroke of plunger.	11½"	11½"	2"	2"	2"	2"	21½"	21½"	21½"	3"	5"	
Adjustment of plunger.	1"	1"	1"	11½"	11½"	11½"	2"	2"	2"	3"	4"	
Diameter of balance wheel.	24"	28"	30"	36"	36"	42"	48"	48"	50"	50"	60"	
Face of balance wheel.	3"	31½"	4"	41½"	41½"	5"	6"	6"	61½"	7"	8"	
Weight of balance wheel, lbs.	200	250	350	500	800	1,000	1,200	1,200	1,300	1,500	2,000	
Speed of balance wheel.	125	100	100	75 to 100	75	50	45	35	30	25	15	
Area of bolster plate.												
Bolster plate furnished with press, thickness.	1½"	1½"	2"	2½"	2½"	3"	3"	3¼"	3½"	3½"	4"	
Geared presses, diameter of gear.	30"	32"	32"	34"	34"	36"	36"	40"	48"	48"	48"	
Proportion of gearing.	5 to 1	5 to 1	5 to 1	5 to 1	6 to 1	6 to 1	6 to 1	6 to 1	7 to 1	8 to 1	10 to 1	
Diameter of pulley.	22"	22"	24"	24"	26"	26"	30"	32"	36"	48"	48"	
Face of pulley.	3"	3½"	4"	4½"	5"	5"	6"	6"	6"	6"	6"	

POWER PRESSES.

STRAIGHT SIDED TRIMMING PRESS
WITH TRIMMING ATTACHMENT.

STRAIGHT SIDED TRIMMING PRESS.

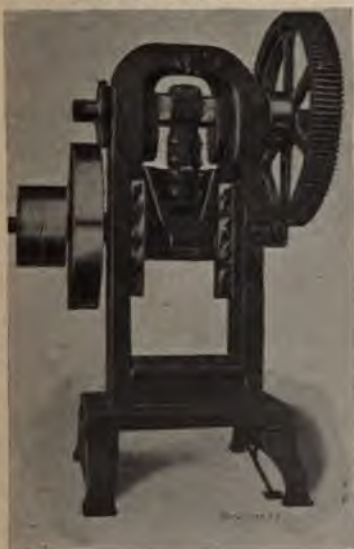


FIG. 11542.



FIG. 11543

SPECIFICATIONS FIGS. 11542 AND 11543.

No. of Press.....	5	6	7	8	9	10	11	12
Weight of press, plain, lbs.....	2,500	4,000	5,000	6,000	8,500	10,000	13,000	16,000
Weight of press, geared, lbs.....	3,000	4,800	6,000	7,000	9,500	12,000	15,000	19,000
Opening in bed, round, lbs.....	5"	6"	7"	8"	9"	10"	12"	12"
Distance from bed to plunger when up.....	8"	10"	12"	12"	12"	14"	15"	15"
Stroke of plunger.....	2"	2½"	3"	3"	3"	4"	4"	4"
Adjustment of plunger.....	3"	3"	3"	4"	4"	5"	5"	6"
Width between housings.....	15"	18"	20"	22"	22"	24"	26"	26"
Length of plunger.....	18"	18"	20"	22"	24"	26"	28"	30"
Size of die bed.....	15" x 18"	15" x 18"	18" x 20"	20" x 22"	22" x 22"	24" x 24"	24" x 26"	24" x 26"
Area of plunger.....	8" x 10"	8" x 10"	8" x 10"	10" x 12"	12" x 12"	14" x 15"	15" x 18"	24" x 26"
Area of bolster.....	15" x 18"	15" x 18"	18" x 20"	20" x 22"	22" x 24"	24" x 24"	26" x 24"	26" x 24"
Hole in bolster, round.....	5"	6"	7"	8"	9"	10"	11"	12"
Thickness of bolster.....	2½"	3"	3"	3½"	3½"	3½"	4"	4"
Distance from floor to bed.....	32"	32"	32"	32"	32"	32"	32"	32"
Distance from floor to center of shaft.....	70"	70"	72"	74"	76"	78"	80"	82"
Diameter of balance wheel.....	32"	36"	40"	44"	48"	56"	60"	66"
Weight of balance wheel, lbs.....	350	600	700	900	1,300	1,800	2,000	2,300
Face of balance wheel.....	4½"	5½"	6"	6½"	7½"	7½"	8"	8"
Diameter of gear.....	34"	36"	40"	40"	48"	48"	.....	54"
Proportion of gearing.....	5 to 1	6 to 1	7 to 1	7 to 1	8 to 1	8 to 1	.....	8 to 1
Diameter of pulley, when geared.....	20" x 6"	22" x 6"	24" x 6"	24" x 6"	24" x 6"	30" x 6"	36" x 8"	36" x 8"

POWER PRESSES.

NO. 5, STYLE D, POWER PRESS, GEARED.

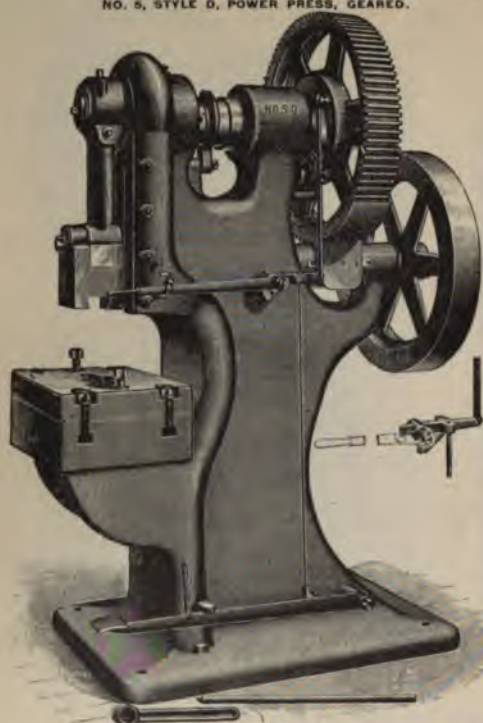


FIG. 11544.

STYLE D PRESSES.

DESCRIPTION FIG. 11544.

Style D presses are designed for general work not requiring feeds. The frame is extremely rigid, and is so constructed as to give large die space and convenience in handling the work.

These presses have proved very efficient and are successful with manufacturers requiring heavy punching, and will do all kinds of forming, bending, punching, perforating or cutting operations, such as can tops and bottoms, pocketbook trimmings, jewelry, watch parts, silver and brass work, guns, sewing machines, bicycles, typewriters, and similar work.

The eccentric adjustment is used, and permits rapid and accurate adjustment of the plunger while forming a perfectly solid connection between the slide and crank shaft.

The presses are provided with our patent instantaneous clutch and stop motion, by the use of which they can be set to run continuously or stopped at each revolution, as the work may require.

Balance wheels are fitted with bronze bushings, and a combined hand and foot trip is furnished with each press.

SPECIFICATIONS FIG. 11544.

	No. 2	No. 3	No. 5	No. 6
Weight of press, plain.....	1,600 lbs.	2,300 lbs.	6,000 lbs.	9,000 lbs.
Weight of press, geared.....	300 lbs.	500 lbs.	1,000 lbs.	1,850 lbs.
Weight of flywheel, plain.....	27" x 4½"	30" x 4½"	42" x 7½"	42" x 7½"
Weight of flywheel, geared.....	1"	1½"	13"	2 ¼"
Size of flywheel, plain.....	3½"	5"	9" x 10½"	11" x 12"
Size of flywheel, geared.....	5½" x 6¼"	6¼" x 7½"	7"	8 ¼"
Stroke.....	4" x 5½"	4¾" x 6½"	6½" x 9"	8" x 10"
Adjustment of slide.....	7"	8"	10"	12"
Hole in bed.....	1½" x 9½" x 11½"	2" x 12½" x 13½"	3" x 16½" x 22½"	3½" x 20" x 24"
Slide to bed, stroke down, adjustment up.....	7½"	10"	16½"	18½"
Size of bottom of slide.....	27" x 32"	30"	54" x 38"	60" x 42"
Distance from center of slide to back.....	150	130	100	85
Size of bolster plate.....	.....	.....	24	20
Distance between die bolts.....	.....	.....	5	Special
Floor space, plain, revolutions.....	14" x 4"	16" x 4"	24" x 5"	28" x 6"
Speed of press, geared, revolutions.....	21½" x ½"	16" x 4"	20" x 6"	24" x 7"
Speed of press, plain, revolutions.....	63½"	75"	7" x 1½"	7" x ½"
No. of countershaft.....	.....	.....	64"	96"
Size of tight and loose pulleys.....	.....	.....	1 to 5	1 to 5
Capacity in high brass.....	.....	.....	.....	.....
Height over all.....	.....	.....	.....	.....
Ratio of gearing.....	.....	.....	.....	.....

POWER PRESSES.

STYLE E PRESSES, ADJUSTABLE BED.

DESCRIPTION FIG. 11545.

These presses were originally designed to accommodate dies of varying thicknesses, and are always in demand by our customers who do a jobbing business in presswork.

The larger sizes are used for bending bicycle handle bars and similar work, as well as for sub-press dies. In the larger sizes the adjustable bed is accurately fitted in a right angled recess, and bolted securely at the apex and both sides, making a firm and rigid bed, fully equal in strength to the one solid with the press, while at the same time by the use of the crank, gears and screw, shown in the illustration, it is adjustable to any position within the capacity of the machine.

This feature is original with us, and patented. The slide is adjusted by an eccentric, while the shafts are of forged steel, fitted with bushings, and the balance wheels bushed with bronze.

Our instantaneous clutch and stop motion is used, and the press can be run continuously or automatically stopped after each revolution. A combined hand and foot trip is furnished with each press.

SPECIFICATIONS FIG. 11546.

No. of press.....	1	2
Weight of press | <i>guaranteed</i>	300 lbs.	700 lbs.
Weight of fly wheel | <i>guaranteed</i>	20 lbs.	150 lbs.
Diameter of fly wheel | <i>guaranteed</i>	12"	18"
Face of fly wheel | <i>guaranteed</i>	2 3/4"	3 1/4"
Stroke (regular).....	1"	3/4"
Adjustment of stroke.....	1"	3/4"
Adjustment of bed.....	4" x 4"	5" x 6"
Hole in bed (regular).....	4"	5" x 6"
Hole in bed, largest possible (extra).....	4 1/2" x 4 1/2"	6" x 6"
Maximum distance from slide to bolster, with stroke down and adjustment up.....	6"	8"
Thickness of bolster plate.....	1/4"	1/4"
Distance between die bolts (regular).....	7 1/2"	11"
Width of bed, left to right.....	14"	17 1/2"
Distance from center of slide to back.....	5"	5 1/2"
Floor space (regular).....	24" x 24"	24" x 32"
Speed of press (plain).....	150 rev.	130 rev.
No. of countershaft (extra).....	2	2
Size of tight and loose pulleys.....	12" x 3"	12" x 3"
Size of driving pulley on countershaft.....	12" x 3"	12" x 3"
Capacity in <i>in.</i> high brass, diameter (plain).....	5"	1 1/2"
Height over all.....	54"	60"
Proportion of gearing.....		

No. of press.....	3	4
Weight of press | <i>guaranteed</i>	1,400 lbs.	2,150 lbs.
Weight of fly wheel | <i>guaranteed</i>	300 lbs.	500 lbs.
Diameter of fly wheel | <i>guaranteed</i>	27"	35"
Face of fly wheel | <i>guaranteed</i>	3 7/8"	4 1/2"
Stroke (regular).....	1 1/4"	2" to 3"
Adjustment of stroke.....	1 1/4"	2" to 3"
Adjustment of bed.....	8" x 8"	8" x 8"
Hole in bed (regular).....	8" x 8"	8" x 8"
Hole in bed, largest possible (extra).....	7" x 7"	8"
Maximum distance from slide to bolster, with stroke down and adjustment up.....	10"	10"
Thickness of bolster plate.....	3/8"	3/8"
Distance between die bolts (regular).....	13 1/2"	15"
Width of bed, left to right.....	21"	30"
Distance from center of slide to back.....	5"	5 1/2"
Floor space (regular).....	28" x 28"	28" x 34"
Speed of press (plain).....	120 rev.	110 rev.
No. of countershaft (extra).....	2	2
Size of tight and loose pulleys.....	14" x 3 1/2"	10" x 4"
Size of driving pulley on countershaft.....	14" x 3 1/2"	10" x 4"
Capacity in <i>in.</i> high brass, diameter (plain).....	5"	6"
Height over all.....	64"	68"
Proportion of gearing.....		1 to 5

NO. 1 STYLE E POWER PRESS, ADJUSTABLE BED.

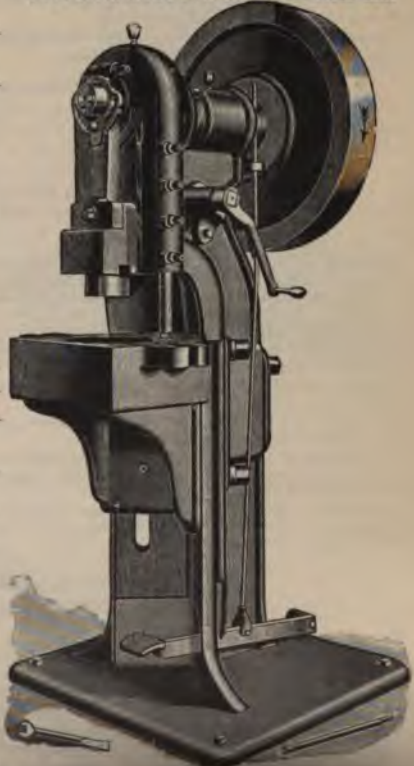


FIG. 11546.

FEEDING ATTACHMENTS FOR POWER PRESSES.

RATCHET ROLL FEED. BUILT IN FIVE SIZES.

DESCRIPTION FIG. 11546.



FIG. 11546.

This is one of the simplest and most useful feeds where long strips or coils of metal are used.

A press with a ratchet roll feed applied, is practically an automatic machine, as it does not require an operator except to start the strip of metal into the rolls; the press will then operate without attention until the strip is finished.

Ratchet roll feeds are made in five sizes, and are applied to style A, B, and C presses, shown in Figs. 11522 to 11524, 11534 to 11539.

This feed, when used with style A presses, is designed to feed from front to back or the reverse. With style B presses it can be arranged right to left, front to back, or the reverse; with style C presses, from right to left, or the reverse.

The length of feed for each stroke is about the same as the diameter of the rolls and can be adjusted to feed a less distance by the adjusting screw and sliding nut in the slotted disk.

The feed rolls are steel. The upper roll is easily adjusted for different thicknesses of stock by the thumb screw regulating the tension on a spring bearing on the upper roll boxes.

Ratchets are cut with fine teeth and two pawls are furnished for accurate adjustment.

This feed is applied to single and double acting presses.

SPECIFICATIONS.

No.....	1	2	3	4	5
Diameter of rolls.....	1 3/4"	1 3/4"	2 1/4"	3 1/4"	4 1/4"
Length of rolls.....	3 1/2"	4 1/2"	5 1/2"	6 1/2"	8"

DIAL FEED. BUILT IN FIVE SIZES.

DESCRIPTION FIG. 11547.

This design of dial feed consists of a flat disk or dial, revolving on a stud fastened to the bolster plate of press. The dial is notched and revolved by means of a finger, operated by the feed disk and connecting rod.

The locking arm is held in contact with the edge of the dial by a spring, which causes it to act as a brake and prevents the dial from going beyond its proper position.

The table is provided to hold the work to be operated upon. The dial is furnished with holes to receive the work, when ordered.

This feed is made in five sizes and is applied to style A presses, shown in Figs. 11522 to 11524 and 11536.

It is designed for feeding blanks, shells, cups, bicycle links and a great variety of pieces upon which a subsequent operation is required. It is especially useful for feeding shells to be re-drawn.

The dial feed is often used to perform two or more operations, as stamping, piercing and forming. With this feed from 40,000 to 60,000 pieces can be operated upon in a day of ten hours.



FIG. 11547.

RATCHET DOUBLE ROLL FEED. BUILT IN FIVE SIZES.

DESCRIPTION FIG. 11548.

This feed is applied to style B presses shown in Figs. 11534, 11535 and 11537. The construction of our double roll feed is essentially the same as single roll feed, but is applied to presses when greater accuracy is required.

The stock can be cut without waste of metal at either the beginning or end of the strip. In connection with our double roll feed a top roll lifting device can be applied. By this the top feed roll is released from contact with the stock during part of the operation. Shown on bolster plate with top roll lifting device.



FIG. 11548.

EMBOSSING PRESS.

DESCRIPTION FIG. 11549.

This style of press is especially designed for engraving or embossing silver or britannia ware, and is equally good for any other work, blanking, swaging or flattening, where a rigid machine is required that will give an extreme pressure at the last end of the stroke.

The power is obtained by means of a toggle or knuckle joint, and with this press, when once adjusted to the dies, and the thickness of stock, all finished pieces will come exactly alike, and there is no danger, if the pieces to be embossed is placed properly in the dies, of uneven work on account of the carelessness of the operator, as is often the case with other classes of embossing presses.

From the cut it will be seen that the crank shaft has an extra bearing on the outside of the wheel, making three bearings on the shaft instead of two, as usual, thus supporting one-half the weight of the wheel and preventing the shaft from wearing out of line.

The press can be made to stop extreme down on the work when so ordered, and this is quite important where the figures are very finely matted, or for forming hot steel or iron in dies.

Our instantaneous clutch is used, and the press can be run continuously or automatically stopped after each revolution. A combined hand and foot trip is furnished with each press.

SPECIFICATIONS.

Weight of press, geared.....	8,000 lbs.
Weight of press, plain.....	6,000 lbs.
Weight of flywheel, geared.....	500 lbs.
Weight of flywheel, plain.....	700 lbs.
Diameter of flywheel, geared.....	30"
Diameter of flywheel, plain.....	42"
Face of flywheel, geared.....	4½"
Face of flywheel, plain.....	6"
Strokes, regular.....	1½"
Adjustment of slide.....	1½"
Hole in bed, regular.....	3" x 3"
Hole in bed, largest possible.....	8" x 8"
Distance between housings or uprights.....	10"
Distance from slide to bed with stroke down and adjustment up.....	8½"
Size of bottom slide.....	55" x 8¾"
Thickness of bolster plate.....	3"
Distance between die bolts, regular.....	10"
Width of bed, left to right.....	14"
Width of bed, front to back.....	20"
Floor space.....	33" x 40"
Speed of press, plain, revolutions.....	80
No. of countershaft.....	4
Size of tight and loose pulleys.....	16" x 4"
Size of driving pulley on countershaft.....	16" x 4"
Height over all.....	80"
Proportion of gearing.....	1 to 5

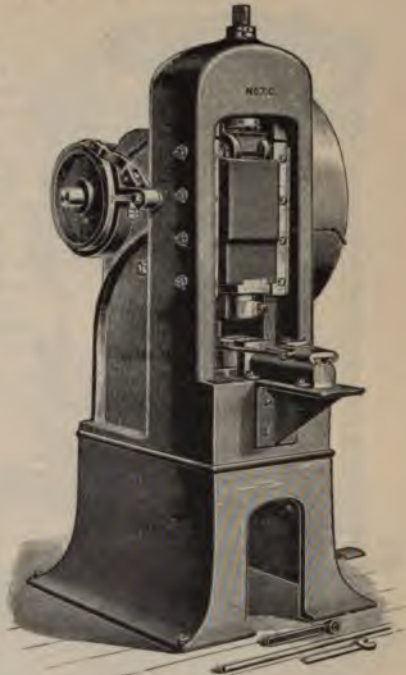


FIG. 11549.

STANDARD COUNTERSHAFTS FOR POWER PRESSES.

SPECIFICATIONS FIG. 11550.



FIG. 11550.

Number of countershaft.....	0	1	2
Drop.....	6½"	8"	8"
Tight and loose pulleys.....	5" x 2"	6" x 2½"	8" x 2½"
Driving pulleys.....	10" x 2"	12" x 2½"	12" x 2½"
Shaft diameter.....	5/8"	1"	1¼"
Weight, net.....	32½ lbs.	55½ lbs.	62 lbs.
Number of countershaft.....	3	4	5
Drop.....	10"	12"	14"
Tight and loose pulleys.....	10" x 4"	12" x 4"	16" x 5"
Driving pulleys.....	20" x 4"	20" x 4"	20" x 5"
Shaft diameter.....	1½"	1½"	2"
Weight, net.....	110 lbs.	110 lbs.	250 lbs.

ADJUSTABLE STROKE DRAWING AND BROACHING PRESSES.

NO. 2 PRESS.

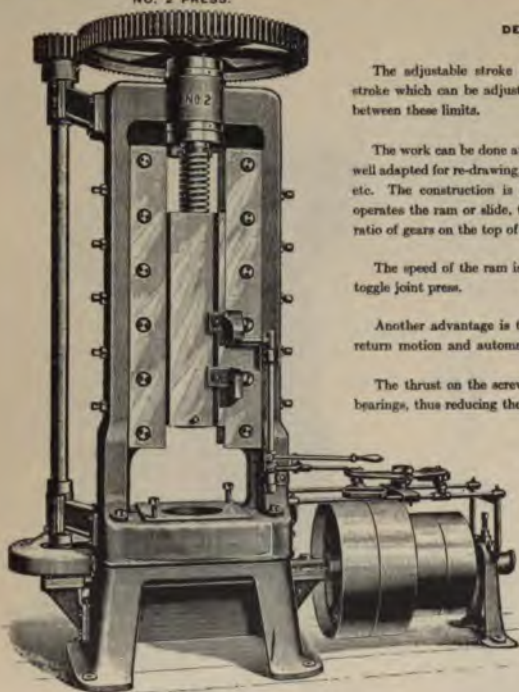


FIG. 11551.

DESCRIPTION FIG. 11551.

The adjustable stroke drawing and broaching presses have a variable stroke which can be adjusted to operate through any intermediate distance between these limits.

The work can be done at any part of the stroke, which makes the machine well adapted for re-drawing, broaching, drawing cups, tubes from heavy metal, etc. The construction is clearly shown in the illustration; a large screw operates the ram or slide, the speed of which can be varied by changing the ratio of gears on the top of the machine.

The speed of the ram is constant, making this style superior to a cam or toggle joint press.

Another advantage is the time gained by the variable stroke. A quick return motion and automatic stop are provided as shown.

The thrust on the screw is taken by one of our patent end thrust roller bearings, thus reducing the friction on the downward stroke.

For using heavy metal which requires considerable power to strip the shell from the plunger, we place one of our end thrust bearings under the gear on the top of the machine to reduce the friction on the return stroke.

The No. 1 press has double thread screw and the No. 2 press has single thread screw.

Each machine is supplied complete with countershaft of size noted below, but special countershafts can be furnished to suit special requirements.

SPECIFICATIONS.

	No. 1 Press	No. 2 Press
Stroke.....	7"	12"
Exerted pressure.....	20 tons	40 tons
Die space.....	13" x 15" x 10" high	16" x 19" x 10" high
Diameter of screw.....	2½"	4½"
Pitch.....	½"	1"
Geared.....	15 revolutions of pulley shaft gives 1" motion of slide	12½ revolutions of pulley shaft gives 1" motion of slide
Driving pulley.....	18" diameter, 5¼" face	24" diameter, 6¼" face
Return pulley.....	18" diameter, 5¼" face	19" diameter, 5¼" face
Weight, net.....	2,000 lbs.	5,200 lbs.
Weight, domestic shipment.....	2,200 lbs.	5,500 lbs.
Weight, foreign shipment.....	2,500 lbs.	6,000 lbs.
Driving pulleys on countershaft, regular.....	28" diameter, 5¼" face	30" diameter, 12½" face
Tight and loose pulleys on countershaft.....	16" diameter, 6¼" face	24" diameter, 7¼" face
Height over all.....	6' 2"	7' 4"
Space occupied.....	2' 6" x 5' 6"	3' 2" x 7' 6"

POWER SPRUE PRESSES.

STYLE D.

DESCRIPTION FIG. 11562.

The illustration shows a press which we have designed with special reference to the needs of brass foundries and other manufacturers of soft metal castings. The operator has both hands free to hold and guide the work, the cutters starting in instant response to the foot pressure on the lever and stopping automatically at the highest part of the stroke. The overhung construction of the frame allows large or irregular shaped castings to be operated upon.

The cutters are made from plain bar steel of the right section, doing away with the necessity of expensive machine work in fitting, and can be set at right angles to the front of press if found more convenient. The adjustment of the cutters permits their use up to the last inch, and they may be accurately set to just cut off the gate without touching each other, thus preserving the cutting edges.

The general design and proportions correspond to our No. 3 style D press, shown in Fig. 11544.

- Weight, net..... 1,300 lbs.
- Weight of balance wheel..... 275 lbs.
- Size of balance wheel..... diameter 30", face 4 1/2"



FIG. 11562.

STYLE F, SPRUE PRESS, MOTOR DRIVEN.



FIG. 11563.

DESCRIPTION FIG. 11563.

These machines are especially designed to meet the requirements of manufacturers of soft metal castings. All wearing parts are made large. The machine is constructed so the operator can use long castings, whether set square on or at an angle to the main gate, can be cut off as easily and as perfectly as those of smaller dimensions. There is an opening between the standards which permits light and allows the castings to be fed from front to back.

Presses are usually furnished with pulleys for belt drive, but can be supplied with direct connected electric motor, as shown, if desired.

SPECIFICATIONS.

	No. 53.	No. 54	No. 55.
Weight, complete.....	800 lbs.	1,500 lbs.	2,800 lbs.
Distance from cutter to frame.....	4"	5"	6"
Distance from cutter to slide, when up.....	4"	5"	6"
Distance between standards.....	5"	7"	9"
Width of cutters.....	1"	1 1/2"	1 1/2"
Weight of balance wheel.....	250 lbs.	350 lbs.	550 lbs.
Diameter of balance wheel.....	24"	28"	30"
Speed of balance wheel.....	125 to 150	100 to 125	100
Will cut off gates, round.....	3/8"	3/4"	1"
Will cut off gates, flat.....	1/4" x 3/4"	3/8" x 3/4"	1/2" x 1 1/2"

NO. 1 DOUBLE SEAMER.



FIG. 11554.

SPECIFICATIONS FIG. 11554.

Weight, about..... 600 lbs.
 Will handle work up to... { 18" dia.,
 16" high.
 Size of driving pulley . . . 8" x 3"
 Size of pulleys on counter. . . 8" x 3"
 Speed of spindle per minute, 250 to
 300 revolutions.

DESCRIPTION FIG. 11554.

All progressive tin can manufacturers use double seamers, which do away with expensive methods and skilled labor. We will make changes on the above machine for the customers' special work, at a small additional cost. All double seamers are fitted with one chuck and one set of curling disks.

Weight, about..... 1,500 lbs.
 Will handle work up to..... 24" diameter, 24" high
 Size of driving pulleys..... 12" x 3 1/4"
 Size of pulleys on counter..... 12" x 3 1/4"
 Speed of spindle, revolutions..... 200 to 300

DOUBLE SEAMING MACHINES.

DESCRIPTION FIG. 11554.

This machine is for double seaming the bottoms of round pails, fruit and paint cans, also other round articles made from sheet metal.

Weight, about..... 350 lbs.
 Will handle work up to..... 6" diameter and 6" high
 Size of driving pulleys..... 8" x 2 3/4"
 Size of driving pulleys on counter..... 8" x 2 3/4"
 Speed of spindle, revolutions per minute..... 300 to 400

NO. 2 DOUBLE SEAMER.



FIG. 11555.

DESCRIPTION FIG. 11555.

Our double seaming machines may be arranged with a four or five step cone pulley, in order to vary the speed, according to the different diameters of the cans. These machines can be operated by unskilled labor with great rapidity and will produce perfect work.

NO. 3 DOUBLE SEAMER.



FIG. 11556.

DRAW BENCHES.

NO. 1 DRAW BENCH.

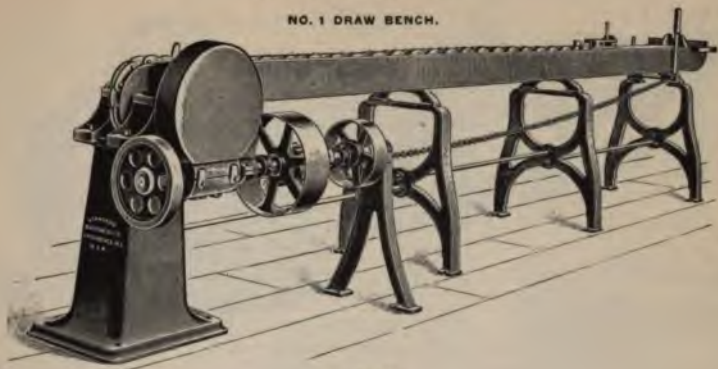


FIG. 11657.

DESCRIPTION FIGS. 11657 TO 11659.

Our line of draw benches comprises three sizes, which have recently been redesigned and perfected on modern lines. In addition to the drawing chains, they are all fitted with return chains which automatically return the tongs to the head of the bench thus allowing the machine to be operated quickly by one man, as there is no time lost by the operator in returning the tongs before starting the second piece.

The return is geared 2 to 1, thereby saving much time, while the operator, standing at the head of the bench, can cause the tongs to turn in any direction at any point on the bench. When the draft is made on the rod or tube and it clears the dies, it can be picked up by the operator, and the tongs will return automatically to the head of the bench and remain until started again by the operator.

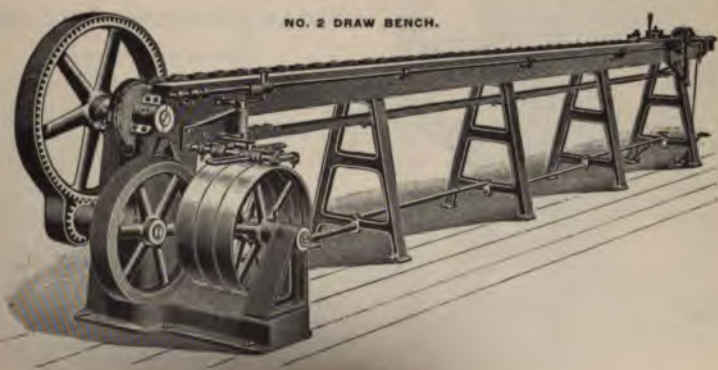
All the driving parts are mounted on a single iron column, giving great stability and steadiness in working. The tongs are steel forgings, of new and efficient form, and have interchangeable jaws, which is a great advantage on account of the hard wear to which tongs are put.

The draw chains are exceptionally heavy and amply strong enough for the strain to which they are subjected.

The benches are constructed entirely of metal, which enables them to stand greater strains than those of ordinary design. They are unquestionably the smoothest running benches on the market.

Description continued on following page.

NO. 2 DRAW BENCH.



DRAW BENCHES.



FIG. 11559.

DESCRIPTION FIGS. 11557 TO 11559.—Continued.

The No. 1 draw bench is used for light jewelers' work, such as drawing seamless wire, small rods, curtain rods, and the like. It is regularly made in 20' lengths, but can be furnished in any length desired, at an extra charge.

Weight, net.....	1,000 lbs.
Floor space occupied.....	32" x 21' 9"
Size of driving pulley.....	16" x 3½"

The No. 2 draw bench is used for the heaviest of jewelers' work. It will reduce about ½" brass rod ¼" at a draw. This bench is thoroughly constructed in every respect, and is one which we recommend especially for heavy work. It is regularly made in 20' lengths, but can be furnished any length desired, at an extra charge.

Weight, net.....	1,400 lbs.
Floor space occupied.....	38" x 22' 0"
Size of driving pulley.....	20" x 3½"

The No. 3 draw bench is designed for drawing steel, copper and brass tubing, as well as solid rods. It is driven by a friction clutch pulley, or can be geared direct by a shaft underneath the floor. In many cases this machine will take the place of a hydraulic draw bench.

Capacity. Reduces solid brass or steel bar 1" in diameter or steel tube 2" in diameter, ¼" at a draw. 8.3 revolutions of worm shaft give 1" of motion to draw chain.

The bench is regularly made in 20' lengths, but can be made any length desired, at an extra charge.

Weight, net.....	6,800 lbs.
Floor space occupied.....	28" x 3' 11"
Size of driving pulley.....	30" diameter, 8¼" face



FIG. 11560.

ROTARY SWAGING MACHINES.

DESCRIPTION FIG. 11560.

The head is fitted with roller bearings, by means of which the machine can be operated continuously without heating and without the necessity of an oil connection. The working mechanism is substantially supported in a cast iron body of ample size and weight to absorb all strains and vibration.

The rolls which operate the plungers or hammers, and which in turn close the dies on the work, are of tool steel, hardened and ground. The main spindle revolves in bronze sleeves, which can be replaced at any time if worn. The dies are made of flat tool steel, being inexpensive and capable of being replaced very rapidly by those of other sizes. The ease and rapidity in changing dies are the most essential features in any reducing machine, and we claim that in this respect our machine is most superior. The swaging dies are fitted into the head of the machine on the end of the spindle or driving shaft, and are closed on the work by being rapidly revolved against the closing hammers or plungers, which come in contact with the hardened and ground tool steel rolls.

All the parts, including the rolls, hammers and dies, being constantly in motion, the friction is reduced to a minimum. These machines are at present made in five sizes.

They are used by jewelers, silversmiths, optical manufacturers, etc., for pointing and reducing wire and tubing. They are especially used by manufacturers of seamless gold plated ware.

For specifications see following page.

ROTARY SWAGING MACHINES.

SPECIFICATIONS FIG. 11560.

No. of Machine.....	1	2	3	4	6
Size of balance wheel.....	12" x 2"	20" x 3"	28" x 4"	35" x 5 1/4"	40" x 5 1/2"
Weight of balance wheel.....	30 lbs.	130 lbs.	260 lbs.	460 lbs.	800 lbs.
Capacity.....	0" to 1/4"	1/8" to 3/4"	3/8" to 1 1/4"	5/8" to 2 1/4"	1/2" to 2 1/4"
Speed of balance wheel, R. P. M.....	500	400	325	250	275
Reduction at one pass.....	3/4"	1/2"	1/8"	1/16"	1/64"
Size of dies.....	5/8" x 1 1/2" x 1 1/2"	3/8" x 1 1/2" x 2"	1 1/2" x 2 1/2" x 2 1/2"	1 3/4" x 2 1/2" x 3 1/4"	3" x 1 1/2" x 3 1/2"
Net weight of machine.....	350 lbs.	700 lbs.	1,400 lbs.	2,900 lbs.	8,000 lbs.
Floor space.....	18" x 24"	24" x 24"	30" x 34"	30" x 43"	37" x 41"
Height over all.....	48"	48"	48"	51"	60"

ADJUSTABLE DRAW PLATES.

DESCRIPTION FIG. 11561.

This cut represents a new labor saving tool that is far superior to any tool heretofore made for drawing or rolling square or flat wire. The opening for the wire can be adjusted to any size within its limit very quickly, without change of rolls, by simply turning the two square head screws shown in cut. These screws are provided with a graduation that will be found very convenient. When a number of pieces of wire are wanted of one size, it is only necessary to draw one piece and notice where the dial are set, returning them to the same place when the finishing strain is taken, and all pieces of wire will come exactly alike. These tools are made strong and durable, and can be used on steel and iron as well as the softer metals. Made in three sizes, as follows:

NO. 1.	
Outside dimensions.....	6" square x 1 1/8" thick
Size of rolls.....	1 1/4" diameter x 3/8" thick
Capacity from.....	0" to 1/4" square
Weight.....	12 lbs.
Weight, foreign shipment.....	15 lbs.
NO. 2.	
Outside dimensions.....	7" square x 1 5/8" thick
Size of rolls.....	1 5/8" diameter x 3/8" thick
Capacity from.....	0" to 3/8" square
Weight.....	18 lbs.
Weight, foreign shipment.....	23 lbs.
NO. 3.	
Outside dimensions.....	11 1/2" x 12 1/2" x 2 1/4" thick
Size of rolls.....	2 1/4" diameter x 3/8" thick
Capacity.....	1/4" to 1/2" square
Weight.....	60 lbs.
Weight, foreign shipment.....	86 lbs.



FIG. 11561.

WIRE COILERS.

NO. 1 WIRE COILER.

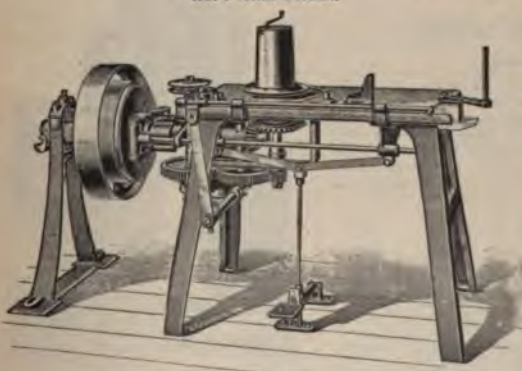


FIG. 11562.

DESCRIPTION FIGS. 11562 AND 11563.

These coilers are designed for jewelers' use mostly, for drawing small wire and very small rods. They are thoroughly constructed in every respect, all gears being cut and all bearings bushed. They are generally built with the wire starting attachment, although machines can be furnished without this if desired.

NO. 1 COILER.

A single gear wire coiler for light work, and generally used to reduce wire after it comes from the draw bench. The principal features are the gearing which is supported in a bearing, bolted to the underside of a heavy table, thus bringing it near the drum and giving a stiff machine. The reverse starting and stopping mechanism is operated by a friction clutch pulley which we find gives better satisfaction than tight and loose pulleys. A wire starting attachment, which starts very slow in order to prevent the point from breaking, is provided, making it practical to operate the machine independent of a draw bench. This machine can be run with or without countershaft as desired.

Capacity: The machine reduces No. 9 B. & S. solid brass wire two numbers at one strain.

Description continued on following page.

DRAW BENCHES.

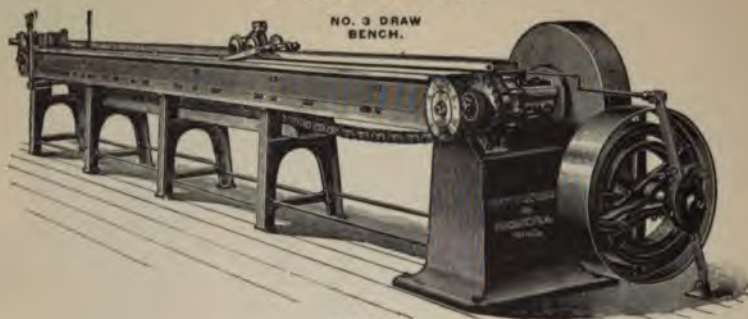


FIG. 11559.

DESCRIPTION FIGS. 11567 TO 11569.—Continued.

The No. 1 draw bench is used for light jewelers' work, such as drawing seamless wire, small rods, curtain rods, and the like. It is regularly made in 20' lengths, but can be furnished in any length desired, at an extra charge.

Weight, net.....	1,000 lbs.
Floor space occupied.....	32" x 21' 9"
Size of driving pulley.....	16" x 3 1/4"

The No. 2 draw bench is used for the heaviest of jewelers' work. It will reduce about 3/4" brass rod 1/8" at a draw. This bench is thoroughly constructed in every respect, and is one which we recommend especially for heavy work. It is regularly made in 20' lengths, but can be furnished any length desired, at an extra charge.

Weight, net.....	1,400 lbs.
Floor space occupied.....	38" x 22' 6"
Size of driving pulley.....	20" x 3 1/4"

The No. 3 draw bench is designed for drawing steel, copper and brass tubing, as well as solid rods. It is driven by a friction clutch pulley, or can be geared direct by a shaft underneath the floor. In many cases this machine will take the place of a hydraulic draw bench.

Capacity. Reduces solid brass or steel bar 1" in diameter or steel tube 2" in diameter, 1/8" at a draw. 8.3 revolutions of worm shaft give 1" of motion to draw chain.

The bench is regularly made in 20' lengths, but can be made any length desired, at an extra charge.

Weight, net.....	5,500 lbs.
Floor space occupied.....	28' x 3' 11"
Size of driving pulley.....	30" diameter, 5 1/4" face

ROTARY SWAGING MACHINES.

DESCRIPTION FIG. 11560.

The head is fitted with roller bearings, by means of which the machine can be operated continuously without heating and without the necessity of an oil connection. The working mechanism is substantially supported in a cast iron body of ample size and weight to absorb all strains and vibration.

The rolls which operate the plungers or hammers, and which in turn close the dies on the work, are of tool steel, hardened and ground. The main spindle revolves in bronze sleeves, which can be replaced at any time if worn. The dies are made of flat tool steel, being inexpensive and capable of being replaced very rapidly by those of other sizes. The ease and rapidity in changing dies are the most essential features in any reducing machine, and we claim that in this respect our machine is most superior. The swaging dies are fitted into the head of the machine on the end of the spindle or driving shaft, and are closed on the work by being rapidly revolved against the closing hammers or plungers, which come in contact with the hardened and ground tool steel rolls.

All the parts, including the rolls, hammers and dies, being constantly in motion, the friction is reduced to a minimum. These machines are at present made in five sizes.

They are used by jewelers, silversmiths, optical manufacturers, etc., for pointing and reducing wire and tubing. They are especially used by manufacturers of seamless gold plated ware.

For specifications see following page.



FIG. 11560.

ROTARY SWAGING MACHINES.

SPECIFICATIONS FIG. 11560.

No. of Machine.....	1	2	3	4	5
Size of balance wheel.....	12" x 2"	20" x 3"	28" x 4"	35" x 5 1/2"	40" x 5 1/2"
Weight of balance wheel.....	30 lbs.	130 lbs.	260 lbs.	460 lbs.	800 lbs.
Capacity.....	0" to 1/4"	3/8" to 1/2"	1/2" to 13/4"	3/4" to 2 1/4"	1/2" to 2 1/4"
Speed of balance wheel, R. P. M.....	500	400	325	250	275
Reduction at one pass.....	25%	25%	15%	15%	15%
Size of dies.....	3/4" x 3/4" x 1 1/2"	1/2" x 1 1/2" x 2"	1 1/4" x 2 1/2" x 2 1/2"	1 1/2" x 2 1/2" x 3 1/4"	3" x 1 1/2" x 3 1/2"
Net weight of machine.....	350 lbs.	700 lbs.	1,400 lbs.	2,900 lbs.	8,000 lbs.
Floor space.....	18" x 24"	24" x 34"	26" x 34"	30" x 43"	37" x 41"
Height over all.....	48"	48"	48"	51"	60"

ADJUSTABLE DRAW PLATES.

DESCRIPTION FIG. 11561.

This cut represents a new labor saving tool that is far superior to any tool heretofore made for drawing or rolling square or flat wire. The opening for the wire can be adjusted to any size within its limit very quickly, without change of rolls, by simply turning the two square head screws shown in cut. These screws are provided with a graduation that will be found very convenient. When a number of pieces of wire are wanted of one size, it is only necessary to draw one piece and notice where the dials are set, returning them to the same place when the finishing strain is taken, and all pieces of wire will come exactly alike. These tools are made strong and durable, and can be used on steel and iron as well as the softer metals. Made in three sizes, as follows:

NO. 1.	
Outside dimensions.....	6" square x 1 1/2" thick
Size of rolls.....	1 1/2" diameter x 1/8" thick
Capacity from.....	0" to 1/8" square
Weight.....	12 lbs.
Weight, foreign shipment.....	15 lbs.
NO. 2.	
Outside dimensions.....	7" square x 1 1/2" thick
Size of rolls.....	1 1/2" diameter x 1/8" thick
Capacity from.....	0" to 3/8" square
Weight.....	18 lbs.
Weight, foreign shipment.....	23 lbs.
NO. 3.	
Outside dimensions.....	11 1/2" x 12 1/2" x 2 1/2" thick
Size of rolls.....	2 1/2" diameter x 3/8" thick
Capacity.....	1/4" to 3/4" square
Weight.....	80 lbs.
Weight, foreign shipment.....	86 lbs.



FIG. 11561.

WIRE COILERS.

NO. 1 WIRE COILER.

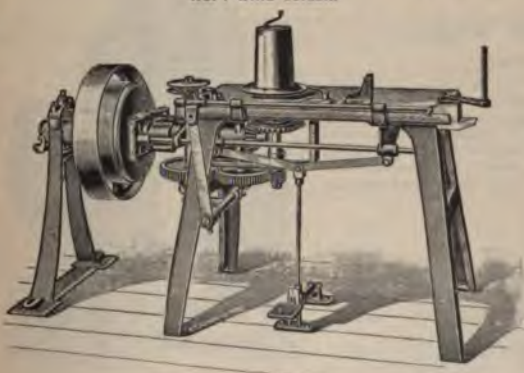


FIG. 11562.

DESCRIPTION FIGS. 11562 AND 11563.

These coilers are designed for jewelers' use mostly, for drawing small wire and very small rods. They are thoroughly constructed in every respect, all gears being cut and all bearings bushed. They are generally built with the wire starting attachment, although machines can be furnished without this if desired.

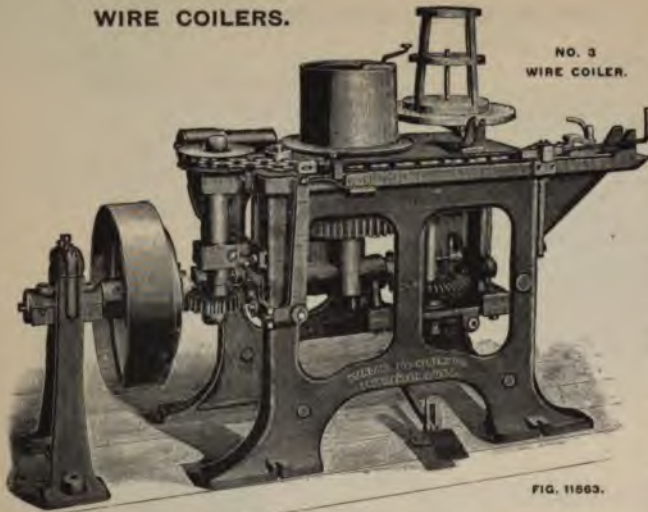
NO. 1 COILER.

A single gear wire coiler for light work, and generally used to reduce wire after it comes from the draw bench. The principal features are the gearing which is supported in a bearing, bolted to the underside of a heavy table, thus bringing it near the drum and giving a stiff machine. The reverse starting and stopping mechanism is operated by a friction clutch pulley which we find gives better satisfaction than tight and loose pulleys. A wire starting attachment, which starts very slow in order to prevent the point from breaking, is provided, making it practical to operate the machine independent of a draw bench. This machine can be run with or without countershaft as desired.

Capacity: The machine reduces No. 9 B. & S. solid brass wire two numbers at one strain.

Description continued on following page.

WIRE COILERS.



NO. 3
WIRE COILER.

DESCRIPTION FIGS. 11562 AND 11563. Continued.

No. 2 coiler. This is designed for medium work, reducing wire from $\frac{3}{8}$ " diameter, to $\frac{1}{2}$ " diameter.

The machine is driven by a friction clutch pulley, which gives entire satisfaction. A wire starting attachment is furnished, if ordered, at extra price.

Capacity: The machine reduces No. 9 B. & S. solid brass wire two numbers at one strain.

No. 3 coiler. Designed for extra heavy work that is usually done on a draw bench. All driving gears are cut, and all important bearings are bushed. The driving mechanism is supported and covered by a heavy frame, giving a stiff machine, and protecting the operator. Power is supplied by a friction clutch, which is operated by the foot. A wire starting attachment, which starts very slow to prevent the point from breaking, is provided, drawing from 24° to 30°. This feature makes it practicable to operate the machine independent of the "draw bench." This machine can be run with or without countershaft, as desired. Capacity: Reduces brass wire $\frac{3}{4}$ " diameter, $\frac{1}{2}$ " at one draw.

FIG. 11563.

SPECIFICATIONS FIGS. 11562 AND 11563.

	No. 1.	No. 2.	No. 3.
Dimensions of drum	9" diameter, 8 $\frac{1}{2}$ " high	9" diameter, 8 $\frac{1}{2}$ " high	12" diameter, 9" high
Table	1' 6" x 3'	2' 10" x 4'	35 $\frac{1}{2}$ " x 22 $\frac{1}{2}$ "
Diam. of driving pulley	18" x 4 $\frac{1}{2}$ "	18" x 5"	20" x 5"
Speed of driving pulley, revolutions per minute	175	175	200
Gears	1 to 2	1 to 3	1 to 10
Weight, net	450 lbs.	650 lbs.	1,400 lbs.
Weight, skidded	525 lbs.	725 lbs.	1,470 lbs.
Weight, boxed	650 lbs.	850 lbs.	1,700 lbs.
Space occupied	26" x 4'	28" x 5'	6' 6" x 2'

WIRE FLATTENING MILLS.

DESCRIPTION FIG. 11564.

Equipped with the patent roller bearings on the roll journals. This mill is used in the manufacture of hard flat steel and brass wire for springs, etc.

Owing to the high rate of speed, and continuous running of the rolls in this form of mill, it has been found necessary hitherto to provide some means of cold water circulation through the rolls, which is a source of trouble and expense. This trouble is entirely obviated by the use of our roller bearings, and we can guarantee the complete absence of heat from our bearings. Worm gears are used to obtain uniform adjustment of the rolls.

No. of mill	$\frac{1}{2}$	1	2	3
Diameter of rolls	4"	6"	8"	10"
Face of rolls	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	5"
Gearing	1 to 3	1 to 3	1 to 4	1 to 9
Diameter of pulleys	14"	16"	16"	20"
Face of pulleys	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "
Floor space	20" x 30"	31" x 42"	35" x 54"	35" x 50"
Height	5'	5'	5' 6"	6' 3"
Weight, net	700 lbs.	1,700 lbs.	2,400 lbs.	4,000 lbs.
Capacity size of wire	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{3}{4}$
Speed of rolls, revolutions per minute	100	100	75	50

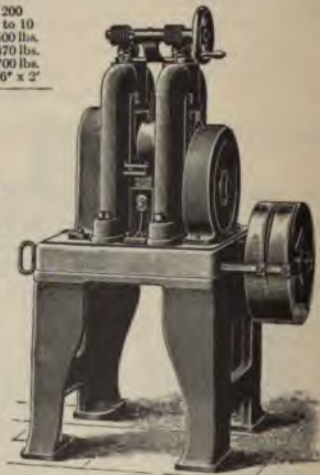


FIG. 11564.

ROLLING MILLS.

DESCRIPTION FIGS. 11565
AND 11566.

NO. 4 ROLLING MILL FITTED WITH ROLLER BEARINGS.

Cut gears are used for all driving mechanism, and gears made of a right and left hand spiral, the combination of which is commonly known as the herring bone gear, are used in the housings of all the smaller size mills, while the larger size mills are equipped with what is termed staggered gears. The object of using these styles of gears is to secure smooth and even running under a heavy strain.

One of the most important improvements in our rolling mills is the application of the Mosberg roller bearing to the journals of the rolls. This feature enables us to build a mill which will do its work faster than the ordinary mill with less than one half of the driving power, as with roller bearings there is scarcely any friction on the roll journal, and consequently no heating of the rolls, involving frequent delays to cool them.

Again the roller bearing enables us to reduce the weight of the mill by reducing the size of the gears, making the machine more compact.

From the cuts it will be seen that all gearing and driving mechanism is protected from dust and dirt by detachable covers, which also remove the possibility of accident to the operator.

Indexed hand wheels are used for setting down the rolls, thus reducing the liability of setting one end of the top roll lower than the other, a saving of time, and more accurate results are thereby accomplished.

All bearings are fitted with bushings, which can be renewed when necessary.

The mills are equipped with friction clutches instead of tight and loose pulleys, unless otherwise ordered. On the larger sizes of mills chilled iron rolls are mostly used, although hardened steel rolls can be furnished if desired.

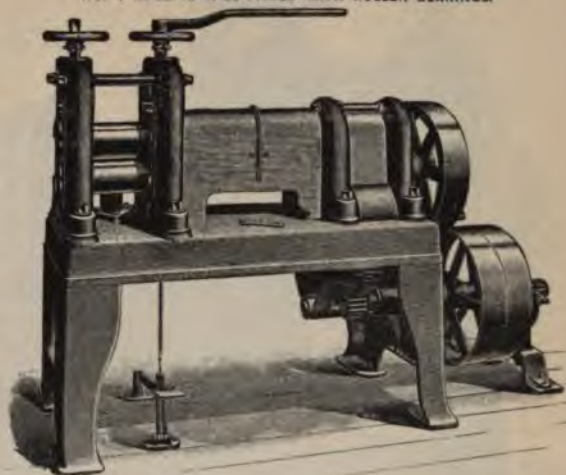


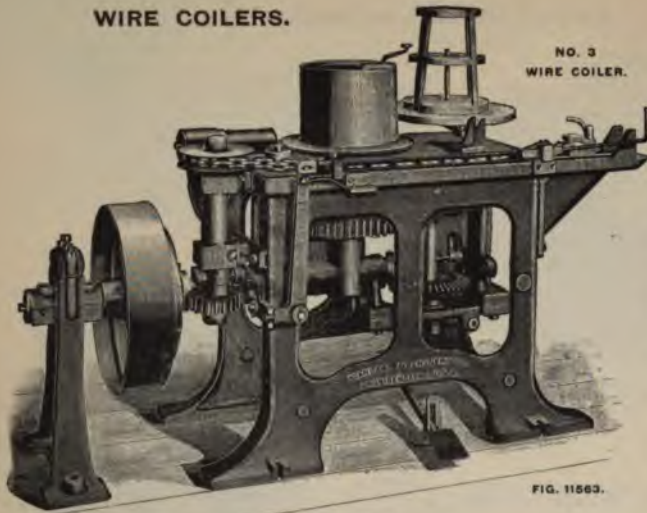
FIG. 11565.

SPECIFICATIONS FIGS. 11565 AND 11566.

No. of Mill.....	1	2	3	4	5	6	7*	8*	9*	10*
Size of rolls, diameter.....	3"	3½"	4"	5"	6"	8"	10"	12"	15"	18"
Size of rolls, face.....	5"	5"	6"	8"	10"	12"	15"	18"	30"	36"
Weight, net.....	1,000 lbs.	1,300 lbs.	1,500 lbs.	3,000 lbs.	5,000 lbs.	6,800 lbs.	.....	.....	.....	.....
Proportion of gearing.....	1 to 12	1 to 14	1 to 14	1 to 16	1 to 18	1 to 20	1 to 30	1 to 32	.....	.....
Dimensions of driving pulley.....	18" x 3½"	20" x 4"	20" x 4"	24" x 5"	30" x 5½"	38" x 6"	30" x 6"	32" x 7"	.....	.....
Space occupied.....	2' x 4' 3"	2' x 5'	2' 2" x 5'	2½' x 7'	3' x 6'	3½' x 9½'	4' x 10½'	4' 4" x 12½'	.....	.....
Weight, domestic shipment.....	1,100 lbs.	1,430 lbs.	1,650 lbs.	3,300 lbs.	5,500 lbs.	7,480 lbs.	.....	.....	.....	.....
Weight, foreign shipment.....	1,400 lbs.	1,750 lbs.	2,000 lbs.	3,750 lbs.	6,000 lbs.	8,000 lbs.	.....	.....	.....	.....

* Details not given in the table will be sent on application.

WIRE COILERS.



NO. 3
WIRE COILER.

DESCRIPTION FIGS. 11562 AND 11563.

Continued.
No. 2 coiler. This is designed for medium work, reducing wire from $\frac{3}{8}$ " diameter, to $\frac{1}{2}$ " diameter.

The machine is driven by a friction clutch pulley, which gives entire satisfaction. A wire starting attachment is furnished, if ordered, at extra price.

Capacity: The machine reduces No. 9 B. & S. solid brass wire two numbers at one strain.

No. 3 coiler. Designed for extra heavy work that is usually done on a draw bench. All driving gears are cut, and all important bearings are bushed. The driving mechanism is supported and covered by a heavy frame, giving a stiff machine, and protecting the operator. Power is supplied by a friction clutch, which is operated by the foot. A wire starting attachment, which starts very slow to prevent the point from breaking, is provided, drawing from 24" to 30". This feature makes it practicable to operate the machine independent of the draw bench. This machine can be run with or without countershaft, as desired. Capacity: Reduces brass wire $\frac{3}{4}$ " diameter, $\frac{1}{2}$ " at one draw.

SPECIFICATIONS FIGS. 11562 AND 11563.

	No. 1.	No. 2.	No. 3.
Dimensions of drum	6" diameter, 8 $\frac{1}{2}$ " high	9" diameter, 8 $\frac{1}{2}$ " high	12" diameter, 9" high
Table	1' 6" x 3'	2' 10" x 4'	35 $\frac{1}{2}$ " x 22 $\frac{1}{2}$ "
Diam. of driving pulley	18" x 4 $\frac{1}{2}$ "	18" x 5'	20" x 5'
Speed of driving pulley, revolutions per minute	175	175	200
Gearing	1 to 2	1 to 8	1 to 10
Weight, net	450 lbs.	650 lbs.	1,400 lbs.
Weight, skidded	525 lbs.	725 lbs.	1,470 lbs.
Weight, boxed	650 lbs.	850 lbs.	1,700 lbs.
Space occupied	26" x 4'	28" x 5'	6' 6" x 2'

WIRE FLATTENING MILLS.

DESCRIPTION FIG. 11564.

Equipped with the patent roller bearings on the roll journals. This mill is used in the manufacture of hard flat steel and brass wire for springs, etc.

Owing to the high rate of speed, and continuous running of the rolls in this form of mill, it has been found necessary hitherto to provide some means of cold water circulation through the rolls, which is a source of trouble and expense. This trouble is entirely obviated by the use of our roller bearings, and we can guarantee the complete absence of heat from our bearings. Worm gears are used to obtain uniform adjustment of the rolls.

No. of mill	$\frac{3}{4}$	1	2	3
Diameter of rolls	4"	6"	8"	10"
Face of rolls	1 $\frac{1}{4}$ "	2 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	5"
Gearing	1 to 3	1 to 3	1 to 4	1 to 9
Diameter of pulleys	14"	16"	16"	20"
Face of pulleys	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	4 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "
Floor space	20" x 30"	31" x 42"	35" x 54"	35" x 56"
Height	5'	5'	5' 6"	6' 3"
Weight, net	700 lbs.	1,700 lbs.	2,400 lbs.	4,000 lbs.
Capacity size of wire	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "
Speed of rolls, revolutions per minute	100	100	75	50

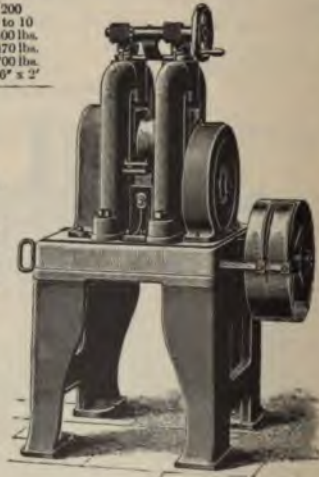


FIG. 11564.

ROLLING MILLS.

DESCRIPTION FIGS. 11555
AND 11556.

NO. 4 ROLLING MILL FITTED WITH ROLLER BEARINGS.

Cut gears are used for all driving mechanism, and gears made of a right and left hand spiral, the combination of which is commonly known as the herring bone gear, are used in the housings of all the smaller size mills, while the larger size mills are equipped with what is termed staggered gears. The object of using these styles of gears is to secure smooth and even running under a heavy strain.

One of the most important improvements in our rolling mills is the application of the Mossberg roller bearing to the journals of the rolls. This feature enables us to build a mill which will do its work faster than the ordinary mill with less than one half of the driving power, as with roller bearings there is scarcely any friction on the roll journal, and consequently no heating of the rolls, involving frequent delays to cool them.

Again the roller bearing enables us to reduce the weight of the mill by reducing the size of the gears, making the machine more compact.

From the cuts it will be seen that all gearing and driving mechanism is protected from dust and dirt by detachable covers, which also remove the possibility of accident to the operator.

Indexed hand wheels are used for setting down the rolls, thus reducing the liability of setting one end of the top roll lower than the other, a saving of time, and more accurate results are thereby accomplished.

All bearings are fitted with bushings, which can be renewed when necessary.

The mills are equipped with friction clutches instead of tight and loose pulleys, unless otherwise ordered. On the larger sizes of mills chilled iron rolls are mostly used, although hardened steel rolls can be furnished if desired.

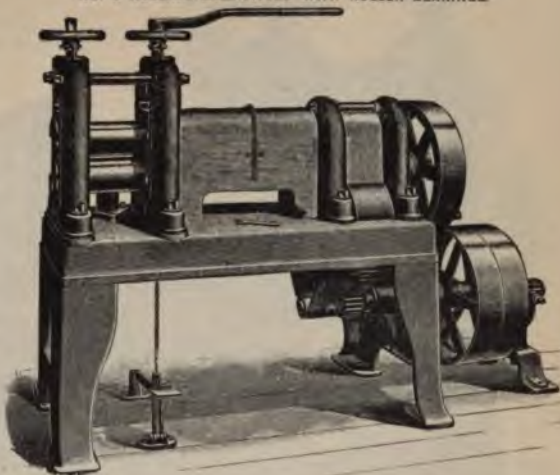


FIG. 11555.

SPECIFICATIONS FIGS. 11555 AND 11556.

No. of Mill.....	1	2	3	4	5	6	7*	8*	9*	10*
Size of rolls, diameter.....	3"	3½"	4"	5"	6"	8"	10"	12"	15"	18"
Size of rolls, face.....	5"	5"	6"	8"	10"	12"	15"	18"	30"	36"
Weight, net.....	1,000 lbs.	1,300 lbs.	1,500 lbs.	3,000 lbs.	5,000 lbs.	6,800 lbs.	.....	.....	.....	.....
Proportions of gearing.....	1 to 12	1 to 14	1 to 14	1 to 16	1 to 18	1 to 20	1 to 30	1 to 32	.....	.....
Dimensions of driving pulley.....	18" x 3½"	20" x 4"	20" x 4"	24" x 5"	26" x 5½"	28" x 6"	30" x 6"	32" x 7"	.....	.....
Space occupied.....	2' x 4' 3"	2' x 5'	2' 2" x 5'	2½' x 7'	3' x 8'	3½' x 9½'	4' x 10½'	4' 4" x 12½'	.....	.....
Weight, domestic shipment.....	1,100 lbs.	1,430 lbs.	1,650 lbs.	3,300 lbs.	5,500 lbs.	7,480 lbs.	.....	.....	.....	.....
Weight, foreign shipment.....	1,400 lbs.	1,750 lbs.	2,000 lbs.	3,750 lbs.	6,000 lbs.	8,000 lbs.	.....	.....	.....	.....

* Details not given in the table will be sent on application.

ROLLING MILLS.

NO. 7 ROLLING MILL
FITTED WITH ROLLER BEARINGS.

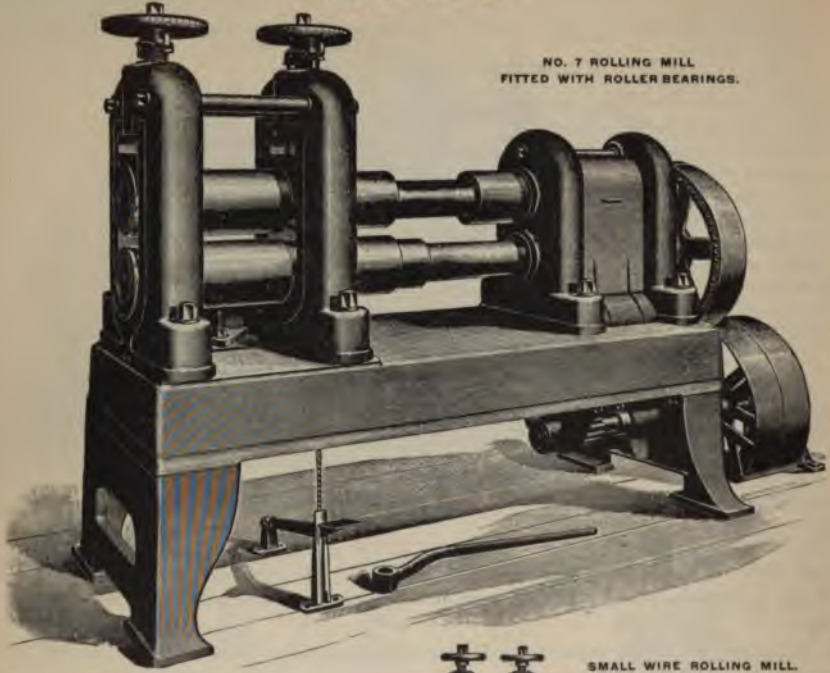


FIG. 11566.

For description and specifications, see preceding page.

SPECIAL ROLLING MILLS.

DESCRIPTION FIGS. 11567 TO 11570.

Some of the special forms of our rolling mills are shown in cuts herewith. We use our patent roller bearings on all styles of our mills where the conditions demand. We will be pleased to estimate on any special type of rolling machinery.

The standard mills can be adapted to a large variety of uses.

SMALL WIRE ROLLING MILL.



FIG. 11567.

SPECIAL ROLLING MILLS.

SPOON GRADING MILL.

FITTED WITH ROLLER BEARINGS FOR SILVERSMITHS.

For description see preceding page.



FIG. 11568.

DOUBLE GEARED GRADING MILL.

FITTED WITH PLAIN OR ROLLER BEARINGS.

For description see preceding page.

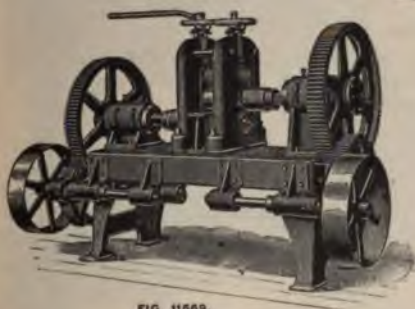


FIG. 11569.

CROSS ROLLING MILL.

FITTED WITH ROLLER BEARINGS FOR SILVERSMITHS.

For description see preceding page.



FIG. 11570.

ROLLING MILLS.

NO. 7 ROLLING MILL
FITTED WITH ROLLER BEARINGS.

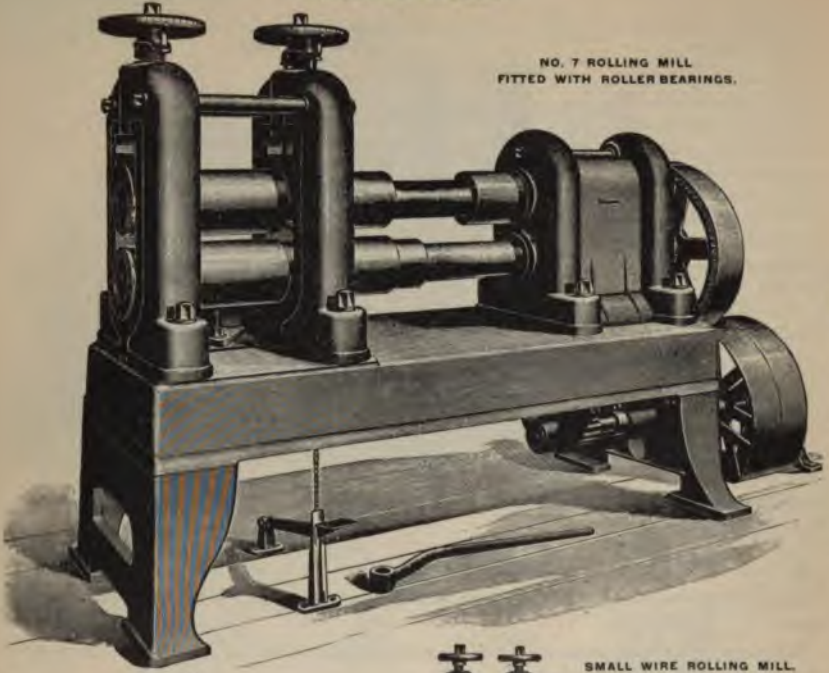


FIG. 11566.

For description and specifications, see preceding page.

SPECIAL ROLLING MILLS.

DESCRIPTION FIGS. 11567 TO 11570.

Some of the special forms of our rolling mills are shown in cuts herewith. We use our patent roller bearings on all styles of our mills where the conditions demand. We will be pleased to estimate on any special type of rolling machinery.

The standard mills can be adapted to a large variety of uses.

SMALL WIRE ROLLING MILL.



FIG. 11567.

SPECIAL ROLLING MILLS.

SPOON GRADING MILL.

FITTED WITH ROLLER BEARINGS FOR SILVERSMITHS.

For description see preceding page.



FIG. 1168.

DOUBLE GEARED GRADING MILL.

FITTED WITH PLAIN OR ROLLER BEARINGS.

For description see preceding page.

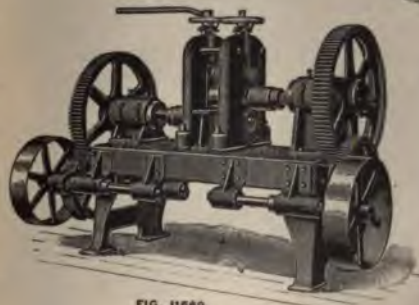


FIG. 1169.

CROSS ROLLING MILL.

FITTED WITH ROLLER BEARINGS FOR SILVERSMITHS.

For description see preceding page.



FIG. 1170.

FOOT POWER SQUARING SHEARS



FIG. 11571.

QUEEN CITY SQUARING SHEARS.

DESCRIPTION FIG. 11572.

Capacity, No. 18 and lighter iron.
Side legs and guides for cutter bar are in one piece.
Provision is made to compensate for the wear of the knives and guides.

The knives are made of best materials and ground perfectly true.
Graduated scale is marked on bed.
On shears 36" and longer it is advisable to use a hold down attachment in front of the cutter bar, to insure a straight cut.
The price includes a set of front, back, bevel and side gauges. The micrometer back gauge is furnished with Queen City shears up to 36" long unless otherwise ordered.

22" Queen City squaring shears weigh 385 lbs.
30" Queen City squaring shears weigh 525 lbs.
36" Queen City squaring shears weigh 600 lbs.
42" Queen City squaring shears weigh 840 lbs.
52" Queen City squaring shears weigh 1,250 lbs.
62" Queen City squaring shears weigh 1,400 lbs.
36" and larger sizes are regularly furnished with a hold down attachment.



FIG. 11573.

EXCELSIOR SQUARING SHEARS.

DESCRIPTION FIG. 11571.

These shears are accurate, durable, and well adapted to the ordinary work of tinsmiths, etc. They work easily, and no more pressure is required when the trade is nearly down than at the beginning of the stroke.

The side legs and guides for the upper knife are cast in one piece, thus securing rigid bearings for the cutter bar. The bed is marked with a graduated scale in 1/4", and a wrench to take out and replace the knives is sent with each machine.

Adjustment is provided for wear of the knives and guides. Our shear knives are made of high grade materials, carefully hardened and ground on automatic machines, which makes them true in cutting edge and seat, to assure a perfect fit without backing.

Our squaring shears are shipped set up, ready for use. For long distances they can be knocked down at extra charge.

The price of the shears includes a set of front, bevel and side gauges, also micrometer back gauge, and the top shelf.

14" Excelsior squaring shears weigh 210 lbs.
22" Excelsior squaring shears weigh 350 lbs.
30" Excelsior squaring shears weigh 450 lbs.
Iron drop tables, shown in cut, are furnished at extra cost.



FIG. 11572.

HERCULES SQUARING SHEARS.

DESCRIPTION FIG. 11573.

Capacity, No. 15 and lighter iron.
30" Hercules squaring shears, with hold down, weigh 650 lbs.
36" Hercules squaring shears, with hold down, weigh 700 lbs.
42" Hercules squaring shears, with hold down, weigh 850 lbs.
52" Hercules squaring shears, with hold down, weigh 1,150 lbs.

These shears will not be supplied without hold down.

POWER SQUARING SHEARS.

DESCRIPTION FIG. 11574.

Capacity, No. 22 and lighter iron.

No.	Will Cut and Square.	Fly-Wheel.			Weight.
		Diam-eter.	Face.	Revolu-tions.	
30	30"	18"	2½"	Per Minute. 75	Lbs. 500

Automatic spring hold down supplied at extra cost.

NO. 30 SHEAR.



FIG. 11574.

DESCRIPTION FIG. 11575.

Capacity, No. 18 and lighter iron or soft steel.

No.	Will Cut and Square.	Fly-Wheel.			Shipping Weight.
		Diam-eter.	Face.	Revolu-tions.	
130	30"	20"	3"	75	Lbs. 850
136	36"	25"	4"	75	1,050
142	42"	25"	4"	75	1,200
152	52"	25"	4"	75	1,500
162	62"	28"	4"	75	1,650
172	72"	28"	4"	75	1,800

Equipment includes a set of front, back, level and side gauges to facilitate cutting to size without marking the sheets.

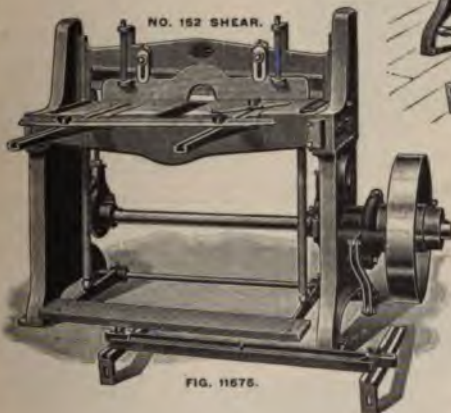


FIG. 11575.

NO. 1120 POWER SQUARING SHEARS.

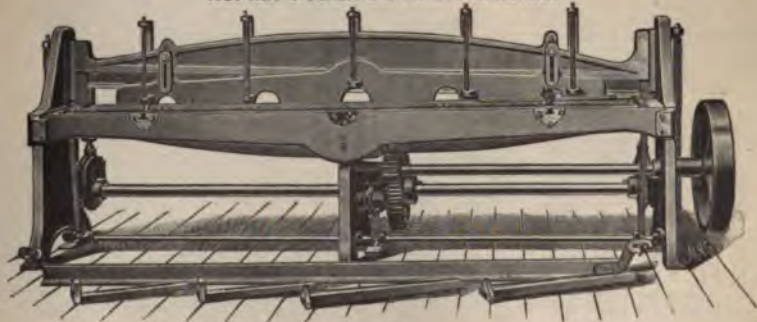


FIG. 11576.

For description see following page.

POWER SQUARING SHEARS.

DESCRIPTION FIG. 11576.

These shears are of substantial construction, with the material properly distributed and all parts well fitted. The wearing surfaces are large and means are provided to take up wear. The knives are made of best materials, carefully hardened and ground perfectly true. A graduated scale is marked on the table.

The hold-down attachment, operated automatically by springs, holds the sheet firmly upon the bed while being cut, so that a perfectly straight cut is obtained.

The shears are driven by belt power, are back geared, thereby insuring smooth and easy action. The gears are machine cut and protected. The motion is controlled by a clutch, and it may be started from any one of the three-foot treadles.

Capacity, No. 18 or lighter iron or soft steel.

No.	Cutting Length.	Fly-Wheel.	Speed of Wheel.	Proportion of Clamping.	Weight.
196.....	8'	25" x 4"	125	1:3	3,400 lbs.
1120.....	10'	28" x 4½"	125	1:3	4,100 lbs.
1132.....	11'	28" x 4½"	125	1:3	4,300 lbs.
1144.....	12'	28" x 4½"	125	1:3	4,600 lbs.

Improved automatic back gauge in place of ordinary one can be supplied at extra cost.

NO. 536 GAP SHEAR.

DESCRIPTION FIG. 11577.

Capacity, No. 16 or lighter iron or soft steel.

These shears are made off new patterns, the outlines being pleasing and modern. There is a gap 15" deep in the housings, which gives the advantage that in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge.

The driving mechanism is overhead to prevent particles of dirt and scale from the sheets dropping into the working parts. The pressure of the cutter bar toward the back is taken up by solid metal, not by loose ribs. The sheets can be moved in cutting position sideways, without obstruction.

A spring hold-down holds the material while being cut. Means are provided for taking up wear on the guides, knives and bearings. The motion is controlled by a positive clutch, actuated from a foot treadle extending the entire length of the machine.

We furnish a set of front, back, bevel and side gauges, also a slitting gauge on the right hand housing, to permit of gauging the second and following cuts, in slitting long sheets, from the cutting line previously obtained.



FIG. 11577.

No.	Will Cut and Squares.	Fly-Wheel.		Speed.	Weight.
		Diameter.	Face.		
530.....	30"	25"	4"	75	1,900 lbs.
535.....	36"	28"	4"	75	2,000 lbs.
542.....	42"	28"	4"	75	2,200 lbs.
552.....	52"	30"	4"	75	2,500 lbs.
562.....	62"	30"	4"	75	2,900 lbs.

NO. 252 SHEAR.

DESCRIPTION FIG. 11578.

Capacity, No. 14 or lighter iron or soft steel.

No.	Will Cut and Squares.	Fly-Wheel.			Speed, Revolutions.	Shipping Weight Lbs.
		Diameter.	Face.	Face.		
225	25"	20"	3"	150	1,200	
230	30"	20"	3"	150	1,400	
236	30"	22"	4"	150	1,500	
242	42"	22"	4"	150	1,750	
252	52"	25"	4"	150	2,200	
262	62"	28"	4"	150	2,500	
272	72"	28"	4"	150	2,600	
296	96"	30"	4"	150	4,400	
2120	120"	34"	4½"	150	5,200	
2132	132"	34"	4½"	150	5,900	

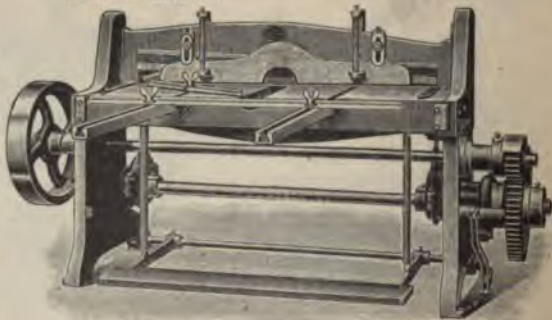


FIG. 11578.

POWER SQUARING SHEARS.

NO. 696 GAP SHEAR.

DESCRIPTION FIG. 11579.

Capacity, $\frac{1}{2}$ " iron or soft steel. Particularly intended for trimming and cutting apart long sheets. These shears are of modern and substantial design and of best workmanship throughout. The open throat or gap in the housings is 15" deep, giving the advantage that, in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge.

The motion is controlled by a positive clutch, which can be actuated from three different points, foot treadles being provided for the purpose. The clutch is coupled to the gear wheel in a positive manner, thereby preventing the cutter bar from dropping ahead of the wheel on account of its weight. This construction does away with balance weights or undue brake pressure, which are usually employed to counteract this tendency.

We furnish a set of front, back, bevel and side gauges, also automatic hold-down attachment with each shear.

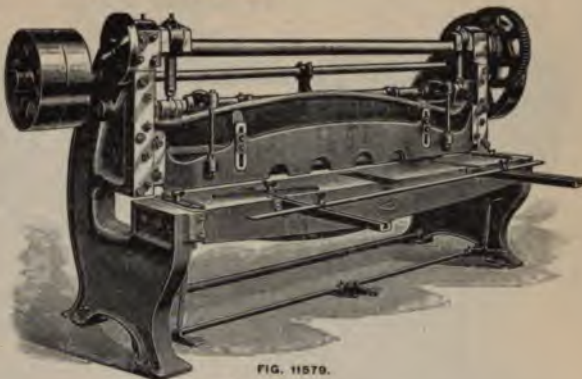


FIG. 11579.

SPECIFICATIONS.

No.	Will Cut and Square.
672.....	72"
696.....	96"
6120.....	120"
6132.....	132"

Diameter.	Driving Pulleys.		Speed, Revolutions.	Proportion of Gearing.	Weight.
	Face.				
20"	5"		200	6:1	5,600 lbs.
20"	5"		200	6:1	7,600 lbs.
20"	5 $\frac{1}{2}$ "		200	6:1	8,500 lbs.
20"	6"		200	6:1	9,700 lbs.

NO. 862 GAP SHEAR.

DESCRIPTION FIG. 11580.

Capacity, $\frac{3}{8}$ " iron or soft steel. In order to make these shears suitable for cutting heavy stock without undue strain, they are made of extra heavy patterns. The design is on modern lines, and all parts carefully fitted. The open throat or gap in the housings gives the advantage that, in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge. The driving mechanism is overhead to give direct pressure upon the cutter bar, and to prevent particles of dirt and scale from the sheets dropping into the working parts. The cutter bar is actuated by means of a forged double crank shaft, and its pressure toward the back is taken up by solid metal, not by loose gibs. The housings are so shaped that sheets can be moved in cutting position sideways, without obstruction.

The automatic hold-down attachment, moved up and down by cams and levers from the main shaft, is guided at both ends, and adjustable for various thicknesses of material. The gears are machine cut, and tight and loose pulleys are provided besides the flywheel. There are means for taking up wear on the guides, knives and main bearings. The motion is controlled



FIG. 11580.

by a positive clutch, actuated from a foot treadle extending the entire length of the machine. We furnish a set of front, back, bevel and side gauges, also a slitting gauge fastened to the right hand housing, to permit of gauging the second and following cuts from the cutting line previously obtained.

SPECIFICATIONS.

No.	Will Cut and Square.
838.....	36"
848.....	48"
862.....	62"

Diameter.	Driving Pulleys.		Speed, Revolutions.	Proportion of Gearing.	Weight.
	Face.				
18"	5"		240	6:1	5,000 lbs.
18"	5"		240	6:1	5,700 lbs.
20"	5"		240	6:1	6,000 lbs.

POWER SQUARING SHEARS.

DESCRIPTION FIG. 11576.

These shears are of substantial construction, with the material properly distributed and all parts well fitted. The wearing surfaces are large and means are provided to take up wear. The knives are made of best materials, carefully hardened and ground perfectly true. A graduated scale is marked on the table.

The hold-down attachment, operated automatically by springs, holds the sheet firmly upon the bed while being cut, so that a perfectly straight cut is obtained.

The shears are driven by belt power, are back geared, thereby insuring smooth and easy action. The gears are machine cut and protected. The motion is controlled by a clutch, and it may be started from any one of the three-foot treadles.

Capacity, No. 15 or lighter iron or soft steel.

No.	Cutting Length.	Fly-Wheel.	Speed of Fly-Wheel.	Proportion of Gearing.	Weight.
106.....	8'	23" x 4"	125	1:3	3,400 lbs.
1120.....	10'	28" x 4½"	125	1:3	4,100 lbs.
1132.....	11'	28" x 4½"	125	1:3	4,300 lbs.
1144.....	12'	28" x 4½"	125	1:3	4,600 lbs.

Improved automatic back gauge in place of ordinary one can be supplied at extra cost.

NO. 536 GAP SHEAR.

DESCRIPTION FIG. 11577.

Capacity, No. 15 or lighter iron or soft steel.

These shears are made of new patterns, the outlines being pleasing and modern. There is a gap 15" deep in the housings, which gives the advantage that in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge.

The driving mechanism is overhead to prevent particles of dirt and scale from the sheets dropping into the working parts. The pressure of the cutter bar toward the back is taken up by solid metal, not by loose gibs. The sheets can be moved in cutting position sideways, without obstruction.

A spring hold-down holds the material while being cut. Means are provided for taking up wear on the guides, knives and bearings. The motion is controlled by a positive clutch, actuated from a foot treadle extending the entire length of the machine.

We furnish a set of front, back, level and side gauges, also a slitting gauge on the right hand housing, to permit of gauging the second and following cuts, in slitting long sheets, from the cutting line previously obtained.

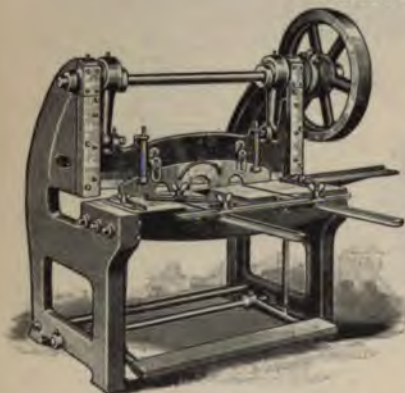


FIG. 11577.

No.	Will Cut and Square.	Fly-Wheel			Weight.
		Diameter.	Faces.	Speed.	
530.....	30"	25"	4"	75	1,900 lbs.
536.....	36"	28"	4"	75	2,000 lbs.
542.....	42"	28"	4"	75	2,300 lbs.
552.....	53"	30"	4"	75	2,500 lbs.
562.....	62"	30"	4"	75	2,900 lbs.

NO. 252 SHEAR.

DESCRIPTION FIG. 11578.

Capacity, No. 14 or lighter iron or soft steel.

No.	Will Cut and Square.	Fly-Wheel.			Shipping Weight Lib.
		Diameter.	Faces.	Speed. Revolutions.	
225	25"	30"	3"	150	1,300
230	30"	30"	3"	150	1,400
236	36"	22"	4"	150	1,500
242	42"	22"	4"	150	1,750
252	52"	25"	4"	150	2,200
262	62"	28"	4"	150	2,500
272	72"	28"	4"	150	2,600
286	86"	30"	4"	150	4,400
2120	120"	34"	4½"	150	5,300
2132	132"	34"	4½"	150	5,500



FIG. 11578.

THE FAIRBANKS COMPANY

POWER SQUARING SHEARS. NO. 696 GAP SHEAR.

DESCRIPTION FIG. 11879.

Capacity, 1½" iron or soft steel.
 Particularly intended for trimming and cutting apart long sheets. These shears are of modern and substantial design and of best workmanship throughout. The open throat or gap in the housings is 15" deep, giving the advantage that, in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge.
 The motion is controlled by a positive clutch, which can be actuated from three different points, foot treadles being provided for the purpose. The clutch is coupled to the gear wheel in a positive manner, thereby preventing the cutter bar from dropping ahead of the wheel on account of its weight. This construction does away with balance weights or undue brake pressure, which are usually employed to counteract this tendency.
 We furnish a set of front, back, bevel and side gauges, also automatic hold-down attachment with each shear.



FIG. 11879.

SPECIFICATIONS.

No.	Will Cut and Square.
672.....	72"
696.....	96"
6120.....	120"
6132.....	132"

Diameter.	Driving Pulleys.		Speed, Revolutions	Capacity of Cutting.	Weight.
	Face.	Diameter.			
20"	5"	20"	200	6-1	5,000 lbs.
20"	5"	20"	200	6-1	7,000 lbs.
20"	5½"	20"	200	6-1	5,000 lbs.
20"	6"	20"	200	6-1	8,500 lbs.

NO. 862 GAP SHEAR.

DESCRIPTION FIG. 11646.

Capacity, 1½" iron or soft steel.
 In order to make these shears suitable for cutting heavy stock without undue strain, they are made of extra heavy patterns. The design is of modern lines and all parts carefully fitted. The open throat or gap in the housings gives the advantage that, in addition to cutting and squaring sheets equal to the length of the knives, sheets of any length can be trimmed and cut apart up to 15" from the edge. The driving mechanism is controlled by three distinct points from the same bar, and to permit operation of left and right from the floor, stepping into the working parts. The entire use is performed by means of a large foot treadle, and the pressure is not the least as shown up by solid metal, not by lever gears. The housings are so shaped that sheets can be moved in cutting position, always, without disturbance.
 The automatic hold-down attachment, mounted on each frame by means of bolts between the main shaft, is guided, adjustable, and adaptable for various thicknesses of material. The gears are cast-iron and well fitted and close rollers are provided to guide the flywheel. There are means for taking up wear on the gears, bearings and main bearings. The motion is controlled



FIG. 11650.

by a positive clutch, actuated from a foot treadle extending the entire length of the machine. We furnish a set of front, back, bevel and side gauges, also a sliding gauge attached to the right hand frame, to permit of gauging the second and following cuts from the cutting line previously obtained.

SPECIFICATIONS.

No.	Will Cut and Square.
836.....	36"
848.....	48"
862.....	62"

Diameter.	Driving Pulleys.		Speed.	Capacity of Cutting.	Weight.
	Face.	Diameter.			
20"	5"	20"	200	6-1	5,000 lbs.
20"	5"	20"	200	6-1	7,000 lbs.
20"	5½"	20"	200	6-1	5,000 lbs.
20"	6"	20"	200	6-1	8,500 lbs.

POWER SQUARING SHEARS.

NO. 8120 GAP SHEAR.

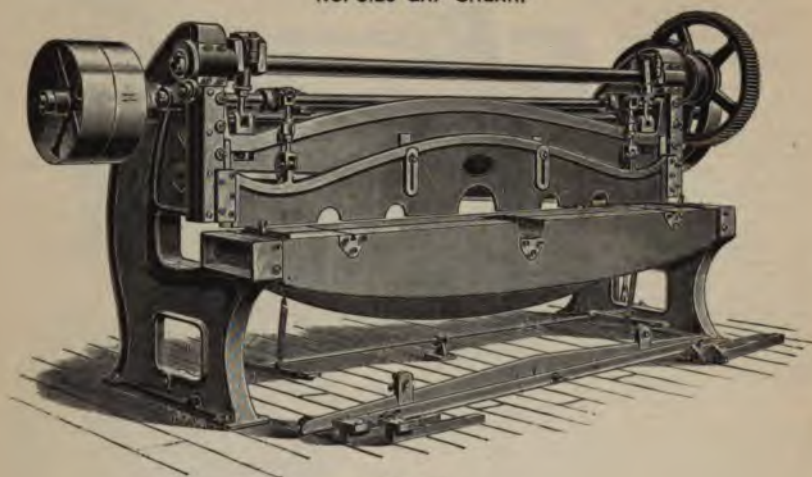


FIG. 11591.

DESCRIPTION FIG. 11591.

Capacity, $\frac{3}{8}$ " iron or soft steel.

These machines are adapted to a large variety of work from the lighter up to heavy gauges, within the limits stated. The open throat or gap in the housings gives the important advantage that sheets of any length can be trimmed and cut apart up to 15" from the edge.

The driving mechanism is overhead to give direct pressure upon the cutter bar, and to prevent particles of dirt and grit from the sheets dropping into the working parts. The two housings are connected by means of a heavy transverse bar, which is in such position that it will not interfere with sheets that may be passed through from front to back. Sheets equal to the cutting length can be handled in this manner.

The cutter bar is actuated by means of a forged double crank shaft, and its pressure toward the back is taken up by solid metal, not by loose gibs. The housings are so shaped that sheets can be moved in cutting position sideways, without obstruction. The table has T slots running from front to back, and from right to left.

In front of the cutter bar there is a positive hold-down, moved up and down by cam and levers from the main shaft, guided at both ends, and adjustable for various thicknesses of material. The gears are machine cut, and tight and loose pulleys are provided besides the flywheel.

A positive clutch controls the motion. The machine is put in action by depressing one of the three foot treadles, located at different points along the front of the shears. After making one stroke the cutter bar with the upper knife will stop at the highest point, unless the foot treadle is kept depressed. The clutch is coupled to the gear wheel in a positive manner, thereby preventing the cutter bar from dropping ahead of the wheel on account of its weight. This construction does away with balance weights or undue brake pressure, which are ordinarily employed to counteract this tendency.

We furnish a set of front, back, bevel and side gauges.

SPECIFICATIONS.

No.	Will Cut and Square.	Diam-eter.	Driving Pulleys.		Systm. Rev.	Proportion of Gearing.	Weight.
			Fasn.	Rev.			
806.....	96"	22"	5"	240	7:1	9,000 lbs.	
8120.....	120"	24"	6"	240	7:1	12,500 lbs.	
8132.....	132"	24"	6"	240	7:1	14,000 lbs.	

THE FAIRBANKS COMPANY

POWER SQUARING SHEARS.

NO. 996 GAP SHEAR.

DESCRIPTION FIG. 11582.

Capacity $\frac{1}{2}$ " iron or soft steel.
 These shears are designed on modern lines, and amply heavy for the duty they are to perform. The housings have a gap or open throat 18" deep, so that sheets of any length can be cut apart up to 18" from the edge. The two housings are connected by means of a heavy transverse bar. The gears are machine cut, and tight and loose pulleys are provided besides a heavy fly wheel. The main shaft is forged of steel with two cranks transmitting the power to the cutter bar by means of two solid connections. The hold-down attachment which is guided at both ends, is intended to hold the sheet firmly upon the bed while being cut. It is moved up and down in a positive manner by means of a cam, thereby doing away with the springs usually employed for raising the hold-down. The hold-down can be quickly adjusted for various thicknesses of stock. Means are provided to take up wear on the guides, knives and other working parts.

The motion is controlled by an automatic clutch, engaged by means of a foot treadle. When the latter is released the cutter bar will stop at the highest point, and when the treadle is kept depressed the motion will be continuous.

The table has T slots running from right to left and from front to back. In line with the latter, brackets can be attached to carry the front gauge. The back gauge can be set close up to the lower knife for cutting narrow strips. On both ends of the bed there are side gauges and we also furnish a bevel gauge. At the right hand side of the machine there is an extension gauge which is used in splitting sheets longer than the knives. After the first cut, the edge obtained at the previous stroke is used to gauge by, not the original edge of the sheet. In this manner alignment of the successive cuts is obtained.

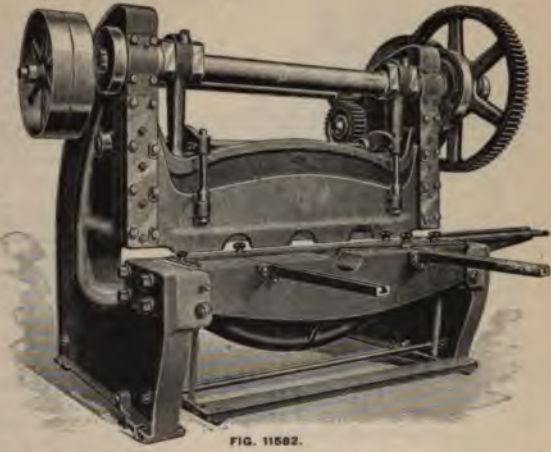


FIG. 11582.

SPECIFICATIONS.

No.	Will Cut and Square.	Driving Pulleys.		Speed, Rev.	Proportion of Gearing.	Shipping Weight.
		Diameter.	Face.			
962	42"	26"	4"	220	1:12	13,500 lbs.
996	96"	28"	5"	220	1:13	17,000 lbs.
9126	120"	28"	5"	220	1:15	20,000 lbs.



FIG. 11583.

MOTOR DRIVEN SQUARING SHEAR.

DESCRIPTION FIG. 11583.

Illustration shows a squaring shear fitted with direct connected electric motor. We are prepared to furnish any of our squaring shears arranged in this manner. On receipt of inquiry, we shall be glad to submit detailed descriptions and prices.

ROTARY SHEARS.

NO. 1 ROTARY SHEAR.

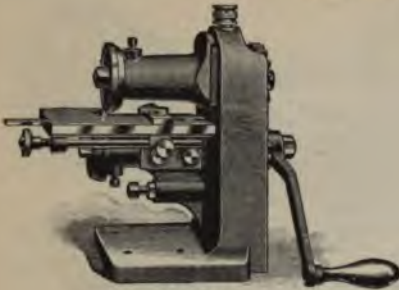


FIG. 11584.

DESCRIPTION FIG. 11584.

These shears are built extra heavy for the work for which they are designed, as we find that the cutters are dulled more by springing and rubbing against each other than by actual work stripping stock. The upper cutter is adjustable, in order to give more or less lap for the different thicknesses of stock. The gauge for width can be quickly moved, and has a screw adjustment for exactness. All parts are scraped to fit, and all bearings are amply large, giving a machine that for power and ease of running for its size cannot be surpassed.

SPECIFICATIONS.

Capacity, width.....	3 1/4"
Capacity, thickness, B. & S.....	No. 16
Diameter of cutters.....	3"
Weight, net.....	25 lbs.
Weight, domestic shipment.....	30 lbs.
Weight, foreign shipment.....	50 lbs.
Space occupied.....	14" x 16"

NO. 2 POWER SHEAR.

NOW FURNISHED WITH FOOT TREADLE.

DESCRIPTION FIG. 11585.

Capacity: Shears will cut 6 1/2" wide No. 10 B. & S.

These shears are built extra heavy to prevent springing, as we find that for the work for which they are designed the cutters are dulled more by springing and rubbing against each other than by the actual work in stripping stock. The upper cutter is adjustable in order to give more or less lap for the different thicknesses of stock, and to allow for grinding. The gauge for width can be quickly moved, and has a screw adjustment for exactness. When running by power the machine can be started or stopped at will of the operator by means of a clutch on the driving pulley operated by a treadle.

SPECIFICATIONS.

Diameter of cutters.....	4"
Size of driving pulley on machine.....	14" x 2 1/2"
Geared.....	1" to 4"
Speed, revolutions.....	250
Weight, net.....	250 lbs.
Weight, domestic shipment.....	300 lbs.
Weight, foreign shipment.....	350 lbs.
Size of driving pulley on countershaft.....	10" x 2 1/4"
Size of tight and loose pulleys on countershaft..	10" x 2 1/2"
Floor space occupied.....	17" x 23"
Countershaft.....	No. 2
Speed of countershaft, revolutions.....	250



FIG. 11585.

ROTARY SHEARS.

NO. 3 POWER SHEAR.

DESCRIPTION FIG. 11566.

This shear has been designed recently, not only for those who require a shear of greater capacity than our No. 2 as to thickness of metal, but for stock of greater widths.

Special attention has been given to furnishing a machine of solid construction, and one which will do accurate work. The cutters are adjustable for different thicknesses and the table is furnished with a gauge for different widths.

This shear is made either plain or geared, and a treadle is furnished with each machine.

SPECIFICATIONS.

Weight, plain.....	725 lbs.
Weight, geared.....	800 lbs.
Ratio of gearing.....	4 to 1
Size of cutter.....	5"
Depth of throat.....	15"
Will slit, in width, up to.....	12"
Will slit, in thickness, plain.....	1/2"
Will slit, in thickness, geared.....	3/4"
Size of driving pulleys.....	20"
Width of driving pulleys.....	3 1/2"
Speed of driving pulleys, plain, revolutions.....	100
Speed of driving pulleys, geared, revolutions.....	225
Countershaft.....	No. 3
Size of driving pulley on countershaft.....	14" x 3 1/2"
Size of tight and loose pulleys on countershaft.....	14" x 3 1/2"
Floor space occupied.....	24" x 30"



FIG. 11566.

NO. 8 ROTARY SHEAR.



FIG. 11567.

SPECIFICATIONS FIG. 11567.

No. of shear.....	4	5	6	8
Weight, plain.....	900 lbs.	1,700 lbs.	.....	.....
Weight, geared.....	1,000 lbs.	2,000 lbs.	3,000 lbs.	5,000 lbs.
Size of cutters.....	4 1/2"	5"	6"	12"
Depth of throat.....	16"	24"	24"	20"
Will slit in width up to.....	14"	20"	.....	.....
Will slit in thick-ness, plain.....	3/4"	3/4"	.....	.....
Will slit in thick-ness, geared.....	1/2"	1/2"	1/2"	1/2"
Size of driving pulleys.....	24"	24"	26"	36"
Width of driving pulleys.....	4"	5"	5 1/2"	6"
Speed of driving pulleys, plain.....	75	75	.....	.....
Speed of driving pulleys, geared.....	175	200	.....	200

CIRCULAR SHEARS.

NO. 4 CIRCULAR SHEAR.



FIG. 11588.

SPECIFICATIONS FIG. 11588.

Number of Shear.....	3	4
Weight.....	800 lbs.	1,500 lbs.
Weight of circular attachment.....	200 lbs.	350 lbs.
Depth of throat of shear frame.....	22"	24"
Depth of throat of circular attachment.....	24"	24"
Capacity of smallest and largest circles.....	4" and 48"	12" and 54"
Size of tight and loose pulleys.....	18" x 3"	24" x 3 1/2"
Speed of tight and loose pulleys.....	150	300
Diameter of cutters.....	4"	5"
Thickness of metal which shear will cut.....	14 gauge	10 gauge

HEAVY SHEAR WITH CIRCULAR ATTACHMENT.



FIG. 11589.

DESCRIPTION FIG. 11589.

The circular attachment shown in this illustration can be applied to either of the shearing machines shown and described under Fig. 11588. The device consists of an extension bar carrying a jaw-shaped holder to carry the plate when it is desired to cut out perfect circles. The holder is adjustable as to its position on the extension bar, the distance between the center of the holding plates and the cutting edge of the blades on the machine proper determining the radius of the circle to be cut out. In view of the fact that the requirements as to depth of throat and length of extension bar on the circular attachment are of such a variable nature, we do not have any definite standards of size to list, but on receipt of information as to customer's actual requirements, we will make quotation on an attachment to suit the actual conditions of the work to be performed.

THE FAIRBANKS COMPANY

SPLITTING SHEARS.

NO. 8 SHEAR.



FIG. 11590.

NO. 9 SHEAR, MOTOR DRIVEN.



FIG. 11591.

DESCRIPTION FIGS. 11590 AND 11591.

Machines are regularly furnished for belt drive, but motor can be attached as shown in Fig. 11591 if desired. Each machine fitted with removable stay bolts.

No. of Shear.....	5	6	7	8	9	10
Weight, about.....	1,000 lbs.	1,500 lbs.	2,000 lbs.	2,500 lbs.	3,500 lbs.	8,000 lbs.
Length of blades.....	8"	8"	10"	12"	12"	14"
Will cut machinery steel, in thickness.....	3/4"	3/8"	1/2"	3/8"	3/4"	1"

HAND SPLITTING SHEARS.



FIG. 11592.

DESCRIPTION FIG. 11592.

The cut represents our hand shears. It is designed for tinners and all workers of light metal.

Will shear 1/4" sheet metal and less, any length or width.

Weight, 65 pounds.

HAND SHEARS.

NO. 3 SPLITTING SHEAR.

SPECIFICATIONS FIG. 11593.

No. of Shear.....	0	1	2	3	4	5
Weight, about.....	25 lbs.	50 lbs.	150 lbs.	250 lbs.	400 lbs.	600 lbs.
Length of blades.....	2'	3'	4'	6'	6'	8'
Will cut machinery steel....	$\frac{1}{8}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "

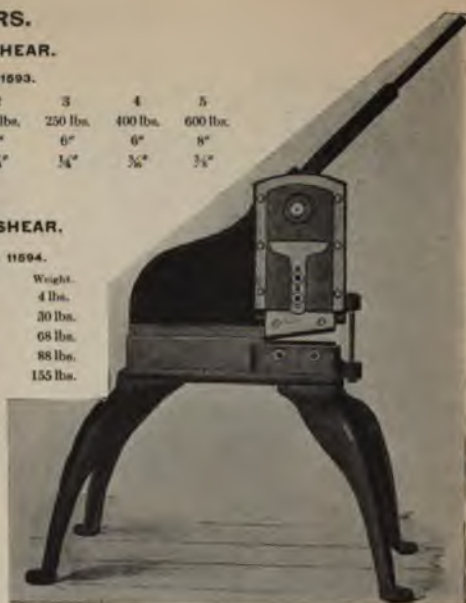


FIG. 11594.

FLAT BAR IRON SHEAR.

SPECIFICATIONS FIG. 11594.

Size.	Capacity.	Blade.	Weight.
0	$\frac{3}{4}$ " x $\frac{1}{6}$ "	1 $\frac{1}{2}$ "	4 lbs.
1	$1\frac{1}{4}$ " x $\frac{1}{4}$ "	3"	30 lbs.
2	$1\frac{3}{4}$ " x $\frac{1}{4}$ "	3 $\frac{1}{2}$ "	68 lbs.
3	2" x $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	88 lbs.
4	2" x $\frac{3}{8}$ "	3 $\frac{3}{4}$ "	155 lbs.



HERCULES BAR IRON SHEARS.



FIG. 11595.

DESCRIPTION FIG. 11595.

These are the most powerful hand-lever shears yet placed upon the market, while in price they are the lowest.

Size.	Capacity.	Weight.
No. 2..	$\frac{1}{2}$ " x 2", $\frac{1}{2}$ " x 3", or $\frac{3}{4}$ " round...	164 lbs.
No. 3..	$\frac{3}{4}$ " x 2", $\frac{3}{4}$ " x 3", $\frac{1}{2}$ " x 4", or 1" rd	375 lbs.

Cutters for flat and for round iron go with each machine.

BAR AND ROUND IRON SHEAR.

FIG. 11593.

DESCRIPTION FIG. 11596.

With these shears the operator stands before his work, the lever working toward instead of away from him. Light iron can be cut with one hand and adjusted with the other. It is the handiest shear made, and requires but one man to operate it. Each machine is thoroughly tested before shipping.

No. 1 will shear $\frac{3}{8}$ " x 3" flat bars; weight 75 lbs.
No. $1\frac{1}{2}$ will shear $\frac{3}{8}$ " x 3" flat bars; weight 90 lbs.

No. $1\frac{1}{4}$ will shear $\frac{3}{8}$ " round bars.
No. 2 will cut $\frac{1}{2}$ " x 2" flat bars; weight 150 lbs.
No. $2\frac{1}{2}$ will cut $\frac{1}{2}$ " x 2" flat bars; weight 165 lbs.

No. $2\frac{1}{2}$ will shear $\frac{1}{2}$ " round.



FIG. 11596.



FIG. 11597.

ROUND IRON SHEAR.

SPECIFICATIONS FIG. 11597.

No.	Cuts.	Weight.
No. 1.....	$\frac{1}{2}$ "	31 lbs.
No. 2.....	$\frac{3}{8}$ "	60 lbs.
No. 3.....	$\frac{1}{4}$ "	90 lbs.
No. 4.....	$\frac{3}{8}$ "	120 lbs.

HAND SHEARS.

ROUND IRON SHEARS.

DESCRIPTION FIG. 11598.

Parties who have quantities of round iron rods and bolts to cut off to lengths should have one of these tools. Do not hack the iron all round with a cold chisel, whack it over the anvil and then hammer the burr off both pieces, but use one of these shears, which, having the holes through castings and cutting knives, made the size of the bar, cuts without making any burr, directly across the iron, and insuring that the piece will not be spread in shearing.

SPECIFICATIONS.

Size.	Capacity.	Weight.
No. 0.	$\frac{3}{4}$ " and smaller.....	4 lbs.
No. 1.	$\frac{5}{8}$ ", $\frac{3}{4}$ " and $\frac{7}{8}$ ".....	15 lbs.
No. 2.	$\frac{7}{8}$ ", $\frac{1}{2}$ " and $\frac{1}{4}$ ".....	21 lbs.
No. 3.	$\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ ".....	26 lbs.
No. 4.	$\frac{3}{4}$ ", $\frac{1}{2}$ " and $\frac{3}{8}$ ".....	42 lbs.
No. 5.	$\frac{3}{4}$ ", $\frac{5}{8}$ " and $\frac{1}{2}$ ".....	94 lbs.
No. 6.	$\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ " and $\frac{1}{2}$ ".....	135 lbs.
No. 7.	1", $\frac{3}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{1}{4}$ ".....	225 lbs.
No. 8.	$1\frac{1}{2}$ ", 1, $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ ".....	284 lbs.

We do not guarantee shears to cut steel, except upon special application, stating size and quality of steel.



FIG. 11598.

SQUARE IRON SHEARS.

DESCRIPTION FIG. 11599.

These shears have the holes through castings and knives made square, so that the corners are not rounded or sides burred or flattened in cutting off. This is a great advantage and saving of time in making railings and similar work.

SPECIFICATIONS.

Size.	Capacity.	Weight.
No. 1.	$\frac{1}{4}$ " and smaller.....	15 lbs.
No. 2.	$\frac{3}{8}$ " and $\frac{1}{4}$ ".....	21 lbs.
No. 3.	$\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ ".....	26 lbs.
No. 4.	$\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{3}{8}$ ".....	42 lbs.
No. 5.	$\frac{3}{4}$ ", $\frac{1}{2}$ " and $\frac{3}{8}$ ".....	94 lbs.
No. 6.	$\frac{3}{4}$ ", $\frac{5}{8}$ " and $\frac{1}{2}$ ".....	135 lbs.
No. 7.	$\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ " and $\frac{1}{2}$ ".....	225 lbs.
No. 8.	1", $\frac{3}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{1}{4}$ ".....	284 lbs.

We do not guarantee shears to cut steel, except upon special application, stating size and quality of steel.



FIG. 11599.

WIRE ROPE SHEAR.

DESCRIPTION FIG. 11600.

This tool we have been making for several years but have never before shown it in our lists. As can be seen, it is a variation of our regular bar iron shear adapted to this work by special knives and an extra heavy body. It has proved a very desirable tool for parties who sell less than full coils of wire rope of medium sizes. Capacity is up to $1\frac{1}{2}$ " steel cable. Weight 175 lbs.

This shear is made of either cast iron or cast steel, as desired.



HAND SHEARS.

ANGLE IRON SHEAR.



FIG. 11601.

DESCRIPTION FIG. 11601.

It is constructed throughout of steel, and for light work makes a very desirable tool. The lever is 60" long.
Capacity, 2" x 2" x 1/4" angles. Weight, 150 lbs.

CHANNEL IRON SHEAR.



FIG. 11602.

DESCRIPTION FIG. 11602.

Each size of angle, T or channel iron has a separate pair of cutters, which are easily put in place. Channel irons, which are very difficult to cut on a hand tool, are cut easily and very clean and true on this machine. The cutters are 3/4" thick, of the best tool steel.

The shipping weight is about 375 lbs. Each machine is furnished with one pair of dies.
Capacity, 2 1/4" channel.

HAND PUNCHES AND SHEARS.

COMBINED HAND PUNCH AND SHEAR.



FIG. 11603.

DESCRIPTION FIG. 11603.

These machines will be found very useful tools for general use, as they are a combination of the round and flat iron shears and the hand punch, and the workmanship put upon them is of the best, no casting fits, but all parts are carefully fitted by hand or machine.

No. 2 will cut 1/2", 3/8" and 1/4" round iron, and 2" x 1/4" bar iron; will punch 1/4" holes in 1/4" iron, 3 1/4" from edge to center of hole. Weight, 200 lbs.

No. 3 will cut 1/4", 3/8" and 1/2" round iron, and 3 1/2" x 1/2" bar iron; will punch 1/4" hole in 3/4" iron, 4" from edge to center of hole. Weight, 400 lbs.

One punch and die only with each machine.

HAND POWER SPLITTING SHEAR AND PUNCH COMBINED.



FIG. 11604.

DESCRIPTION FIG. 11604.

Will shear 1/4" plate any width or length.

Will punch 3/8" hole in 3/8" plate.

Length of shear blade 6 1/2".

Each end is independent of the other.

Weight, 550 lbs.

HAND PUNCHES AND SHEARS.

DESCRIPTION FIG. 11605.

Will shear.....1" round bars.
 Will shear..... $\frac{1}{2}$ " x 4" flat bars.
 Will shear..... $\frac{7}{8}$ " x $\frac{1}{4}$ " band iron.
 Will punch..... $\frac{3}{8}$ " hole in $\frac{1}{2}$ " plates.
 Will punch to center of 14".

Weight, 800 lbs.

Can be equipped with angle shearing attachment.

This machine is of very generous proportions, built for the use of blacksmiths, wagon and sleighmakers, whose work requires heavy punching and shearing. It has three pairs of knives, one for cutting flat bars, one for round iron and one for cutting band iron. Three punches and dies and a lever bar go with this machine.

NO. 15 COMBINED PUNCH AND SHEAR.



FIG. 11605.

DESCRIPTION FIG. 11606.

Will shear $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " or $\frac{3}{4}$ " x 3" bars or $\frac{3}{8}$ " round iron.
 Will punch $\frac{3}{8}$ " hole in $\frac{3}{8}$ " plate.
 Will punch to center of 6".
 Weight, 210 lbs.

NO. 33 COMBINED HAND PUNCH AND SHEAR.



FIG. 11606.

DESCRIPTION FIG. 11607.

Will shear $\frac{1}{2}$ " x 4" or $\frac{3}{8}$ " x 3" flat bars or 1" round iron.
 Will punch $\frac{1}{4}$ " hole in $\frac{1}{2}$ " plate.
 Will punch to center of 6".
 Weight, 510 lbs.

NO. 6 COMBINED HAND PUNCH AND SHEAR.



FIG. 11608.

NO. 66 COMBINED HAND PUNCH AND SHEAR.



FIG. 11607.

DESCRIPTION FIG. 11609.

This machine is furnished with three punches and dies and a lever bar. All hand-power machines should be rigidly fastened to the floor to secure good results.

Will shear..... $\frac{1}{2}$ " x 4" flat bars.
 Will shear.....1" round bars.
 Will punch..... $\frac{3}{8}$ " hole in $\frac{1}{2}$ " plate.
 Will punch to the center of 8".
 Weight, 570 lbs.

HAND PUNCHES.

NO. 7½ HAND PUNCH.

DESCRIPTION FIG. 11609.

These punches have been especially designed for use of boiler makers, but can be also used on a large variety of other work. They are made in twelve sizes, as follows:

- No. 27 will punch 3½" hole in 5½" plate; 5" depth of throat; weight, 225 lbs.
- No. 28 will punch 3½" hole in 5½" plate; 10" depth of throat; weight, 450 lbs.
- No. 29 will punch 3½" hole in 5½" plate; 15" depth of throat; weight, 750 lbs.
- No. 31 will punch 3½" hole in 5½" plate; 18" depth of throat; weight, 875 lbs.
- No. 31½ will punch 3½" hole in 5½" plate; 4½" depth of throat; weight, 170 lbs.
- No. 41 will punch 3½" hole in 5½" plate; 15" depth of throat; weight, 790 lbs.
- No. 42 will punch 3½" hole in 5½" plate; 15" depth of throat; weight, 900 lbs.
- No. 43 will punch 3½" hole in 5½" plate; 30" depth of throat; weight, 1,250 lbs.
- No. 44 will punch 3½" hole in 5½" plate; 30" depth of throat; weight, 2,400 lbs.
- No. 45 will punch 3½" hole in 5½" plate; 30" depth of throat; weight, 2,650 lbs.
- No. 46 will punch 3½" hole in 5½" plate; 48" depth of throat; weight, 4,700 lbs.
- No. 47 will punch 3½" hole in 5½" plate; 48" depth of throat; weight, 4,650 lbs.



FIG. 11609.

LYON'S PATENT HAND PUNCHES.

SPECIFICATIONS FIG. 11610.

No.	Depth of Jaw.	Diameter of Hole.	Thickness of Iron.	Weight.
0.	2½"	3"	3"	33 lbs.
1.	3½"	3"	5"	65 lbs.
2.	3½"	3"	3"	115 lbs.
3.	4"	5"	5"	175 lbs.
3½.	4"	5"	5"	200 lbs.
4.	4"	5"	3"	325 lbs.
5.	7½"	3½"	3½"	500 lbs.

One round punch and die furnished with each machine.



FIG. 11610.

REAR WORKING LEVER PUNCH.

DESCRIPTION FIG. 11611.

The levers, gears, blocks and pins are all made of steel in the No. 3 size, but the No. 23 is made of steel throughout.

No.	Size of Hole.	Thickness of Iron.	Depth of Jaw.	Weight.
3.	3"	3"	3½"	164 lbs.
23.	3"	3"	4½"	440 lbs.

NO. 6 HAND PUNCH.

DESCRIPTION FIG. 11612.

This cut shows a heavy punch made for the use of iron railing manufacturers, bridge and building contractors and truck manufacturers.

The gears and arms are made of tructible steel; the pins of the best tool steel. The plunger is square; the bearing very long, carefully fitted and scraped, thus insuring long-wearing qualities and the punch entering any shaped die properly. The strain between arm and plunger is taken upon a solid block, well fitted, easily gotten at and lubricated, and so designed that it has only 1/6" of revolution. The opening behind the punch is 7½" deep by 6" high. The hole in lower jaw is 1" x 1½", which is large enough for iron railing tenoning. Upon special order the hole in lower jaw is made 1½" x 3¼" for punching truck wrung irons 1½" x 2½". A hole of 3/4" in diameter can be punched in 1/2" iron. The punch weighs about 1,025 lbs.



FIG. 11611.



FIG. 11612.

HAND PUNCHES.

DEEP THROAT PUNCH.

DESCRIPTION FIG. 11613.

To meet the occasional demand for a cheap, light punch with deeper jaw, we offer this style. A roller on the end of the lever, below bearing bolts, works in a slot in top of plunger. The lever will work either to the front or rear.

NO. 1 PUNCH.

This size will punch $\frac{1}{8}$ " hole in $\frac{1}{4}$ " iron 6" from edge.
Weight, about 60 lbs.

NO. 2 PUNCH.

This size will punch $\frac{1}{8}$ " hole in $\frac{1}{4}$ " iron 6" from edge.
Weight, 140 lbs.

NO. 3 HAND PUNCH.



FIG. 11614.



FIG. 11613.

SPECIFICATIONS FIG. 11614.

No. of punch	0	1	2	3	4	5
Weight, about	25 lbs.	50 lbs.	150 lbs.	300 lbs.	500 lbs.	600 lbs.
Will punch machinery steel, in thickness	$\frac{1}{4}$ " x $\frac{1}{8}$ "	$\frac{1}{4}$ " x $\frac{3}{8}$ "	$\frac{1}{4}$ " x $\frac{1}{4}$ "	$\frac{3}{8}$ " x $\frac{1}{2}$ "	$\frac{1}{2}$ " x $\frac{1}{4}$ "	$\frac{1}{2}$ " x $\frac{3}{8}$ "
Opening in bed, round	1"	2"	2 $\frac{1}{2}$ "	3"	3 $\frac{1}{2}$ "	4"
Distance back from center of punch	2"	2"	2 $\frac{1}{2}$ "	3"	3 $\frac{1}{2}$ "	4"
Distance from bed to plunger, when up	3"	3"	3"	3 $\frac{1}{2}$ "	3 $\frac{1}{2}$ "	4"

No. 0, 1, and 2 for bench use; 3, 4 and 5 on legs.

IMPROVED HYDRAULIC PUNCH.

DESCRIPTION FIG. 11615.

The punch is driven down by operating the pump inside the head or reservoir, the piston of which is connected to the socket in which the upper lever is shown. It is raised by bringing the socket down against the log on head and pushing down the lower socket by a second lever, which does not interfere with that of the pump.

All parts are readily accessible, and very carefully designed to avoid the tricky working and short wearing quality of previous designs of this class of tools. The head may be turned to any desired position, and irregular dies may be used without danger. Body and working parts are steel.



FIG. 11615.

SPECIFICATIONS FIG. 11615.

Size.	Diameter of Hole.	Thickness of Iron.	Depth of Jaw.	No. of Gland.	No. of Punch.	No. of Die.	Weight.
0	$\frac{1}{8}$ "	$\frac{1}{4}$ "	1 $\frac{1}{2}$ "	Special	Special	Special	30 lbs.
1	$\frac{1}{8}$ "	$\frac{1}{2}$ "	2 $\frac{1}{2}$ "	4	4	4	105 lbs.
1x	$\frac{1}{8}$ "	$\frac{1}{2}$ "	6"	4	4	4	140 lbs.
2	1"	$\frac{1}{2}$ "	2 $\frac{1}{2}$ "	5	5	4	130 lbs.
2x	1"	$\frac{1}{2}$ "	4 $\frac{1}{2}$ "	5	5	4	165 lbs.
3	1 $\frac{1}{2}$ "	$\frac{3}{4}$ "	3"	6	6	5	220 lbs.
3x	1 $\frac{1}{2}$ "	$\frac{3}{4}$ "	4"	6	6	5	300 lbs.
4	1 $\frac{1}{2}$ "	1"	3 $\frac{1}{2}$ "	7	7	6	325 lbs.

One round punch and die furnished with each tool.

PORTABLE HYDRAULIC BEAM PUNCH.

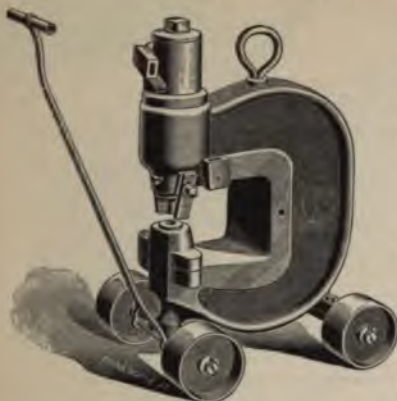


FIG. 11616.

DESCRIPTION FIG. 11616.

This punch is operated by a pump worked by a lever inserted in the socket shown on the side of the head. The parts are all easy of access and reliable, and the head may be turned to operate the lever from any position. The body of the punch is steel. The throat is 9" deep by $7\frac{3}{4}$ ", allows a beam to be punched close to the flange or 9" from edge. It also allows angle or T iron to be punched without pushing lengthwise through the punch.

Face of die to ground, $14\frac{1}{4}$ ".

One movement of the lever in the lower socket withdraws the punch entirely from the iron, or brings the punch down on the work without the labor and loss of time necessary to pump it down.

The punches are prevented from turning, thus allowing the use of irregular-shaped dies without danger of the punch coming down on the die. The hand ring is put on for lifting or suspending the punch. Larger sizes to order.

Capacity of punch, with one man on lever 1" round hole in 1" iron.

Weight, 645 lbs.

COMBINED PUNCHES AND SHEARS.

NO. 12 COMBINED PUNCH AND SHEAR.

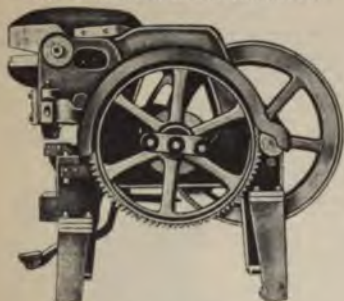


FIG. 11617.

DESCRIPTION FIG. 11617.

Will shear $4\frac{1}{2}$ " x $\frac{3}{4}$ " flat bars.

Will shear 6" x $\frac{3}{4}$ " band iron.

Will shear $1\frac{1}{4}$ " round iron.

Will punch $\frac{3}{4}$ " hole in $\frac{5}{8}$ " plates.

Will punch to center of 14". Should run 200 revolutions per minute. Weight, 2,600 lbs.

Machine can be equipped with angle-shearing attachment, if desired.

NO. 17 COMBINED PUNCH AND SHEAR.



FIG. 11618.

DESCRIPTION FIG. 11618.

Will shear $4\frac{1}{2}$ " x $\frac{3}{8}$ " flat bars.

Will shear $1\frac{1}{4}$ " round iron.

Will punch 1" hole in $\frac{3}{8}$ " plate.

Will punch to the center of 20".

Weight, 4,000 lbs.

This machine can be fitted with "architectural jaw" for handling structural shapes, if desired.

STANDARD PUNCHING AND SHEARING MACHINES.

DESCRIPTION FIGS. 11619 TO 11633.

Note 1. These machines are made either double or single ended. The meaning of the terms is readily understood. The word "combined" is sometimes used instead of "double-ended," although the single machines are combined in one sense—i.e., used for both shearing and punching. The double-enders are practically two machines in one, each starting and stopping independently of the other by its own clutch, and all regular tools and attachments will fit either end of the machine interchangeably.

Note 2. The machines mentioned in the above list are made with throats from 6' up to 72" in depth. Our deep-throat patterns vary as follows: 16", 20", 25", 30", 36", 42", 48", 54", 60", and 72"

Anything below 16" we call a short-throat pattern. Intermediate sizes can be made between the figures given, but is scarcely worth while to do so, as no expense is saved by the taking of intermediate instead of the next size greater depth. The deep-throat machines are made from particularly heavy patterns designed to give the full capacity of the machine in every case. The number of the machine indicates the capacity, whatever the throat. For instance, the No. 15 has the same capacity, whether with an 8" or a 54" throat; the depth of throat being measured from the center of the punch or shears horizontally back to face of the frame. The only exception in this rule is as follows: That when a short-throat pattern is used from 8" up to 15", the strength of the frame is somewhat less for 12" or 15" throat than for the shorter throat. For instance, we use same frame for a No. 15 8" and 12" throat. We use same frame for a No. 14½ 9", 12", and 15"; so that with the 15" throat the No. 14½ has less strength of frame and capacity. This is the only exception, and all the deep throats have same capacity as short throats; in fact the deep throats are built with actually more proportionate strength, in order to prevent the spring in the jaws, which with a shorter throat is not so noticeable as when multiplied by the longer jaws.

Combining different depths of throat. All different depths of throat of the same size machine can be combined together. For instance a 9" throat can be combined with a 48" throat in the No. 14½ size. But one depth of throat of one size machine cannot be combined with the same or with a different depth of throat of another size machine.

We do not furnish reinforcing bolts with the deep-throat patterns, because the frames are made heavy and rigid enough to do the work without. It seems to us simply absurd to buy an expensive, deep-throat machine, and then have to use reinforcing bolts, which practically convert it into a short-throat machine. Moreover, the bolts are of little value.

Note 3. Standard equipment regularly furnished unless otherwise specified is one pair of shears, also one punch and die with the necessary connections and the usual gauges, stripper, and wrenches. Special shears, dies, gang dies, blades for rounds, angle shears, architectural jaw, automatic stop, etc., when desired, are charged extra.

Note 4. Splitting shears or plate shears stand parallel with the front of the head, and are designed for continuous cutting of the sheet lengthwise without notching the sheet at either end of the blade. The width of the strip or plate which can be split off is of course limited by the depth of the throat.

Cutting-off shears can be made parallel with the front of the machine, similar to splitting shears, if so desired, but if made the same length as the regular splitting shears they must be used for cutting thinner plates or bars than the regular splitting shears would handle.

Note 5. The capacity of a machine for plate shearing, or splitting, is limited by the length of stroke, length of shear blades, and the degree of angle between the blades. The shorter the blades and the greater the angle the heavier the plate which can be cut, but in the same degree will the cuts be shorter and the plate that is cut off will be bent downward during the cutting. Thus by making the blades shorter and the angle large, a smaller machine can be sold and used for the same work. It has been our practice to make the blades longer, with less angle, and thus requiring a heavier machine than is customary with other manufacturers. But this permits of longer cuts; that is, quicker work and less bending on the plate cut off. But it is immaterial to us which kind of blades we furnish with a machine, and can as well furnish the shorter blades with more angle, and in connection a lighter and less expensive machine, if so desired.

Note 6. It will be understood that the shape of the jaws is built to suit different classes of work; for instance, boiler work, architectural work, large die surfaces, etc. We solicit inquiries respecting adaptation of machines to special work. (See note 7.)

Note 7. The architectural jaw is a very important feature because so frequently needed for boiler and architectural work. The projecting steel die holder permits of punching flanges of I-beams, channels, angles, and also boiler heads.

In connection with the architectural jaw, the front of table, or lower jaw, is separate, and the separate piece is called the filler block. When the filler block is replaced, the machine is practically the same as if without the architectural jaw, and all the regular shearing and punching attachments can be used. When the filler block is removed, and the projecting steel die holder put on, it is then adapted to punching flanges.

If a machine having architectural jaw is to be used for punching only, the filler block may be omitted, and some expense saved thereby.

Description continued on following page.

STANDARD PUNCHING AND SHEARING MACHINES.

DESCRIPTION FIGS. 11619 TO 11633.—Continued.

Note 8. Angle shearing requires considerable power for the reason that, in order not to distort the angle, the blades are made so as to strike the surface of the metal at all points at the same time; thus differing from the regular bar and plate shears which are made with a rake or bevel so as to distribute the strain over a greater interval of time. Consequently the practical capacity of a machine is never so great for angle shearing as for plate and bar shearing.

Note 9. In cutting rounds, the capacity of the machine is limited rather by the stroke than by its actual strength. Frequently notched blades are used for cutting off rounds larger in diameter than the length of stroke, because it is not necessary that the blades shall pass each other to cut off.

Note 10. The steel ram instead of cast iron, although the latter is standard, is desirable where severe shearing strains come on the machine. Shearing, under certain conditions, causes a twisting or wedging strain that is more severe than punching.

Note 11. The adjustment of the ram is seldom used, or speeded, for punching or shearing, although desirable for forming and riveting and can be put on if desired at an extra cost.

Note 12. Weights given in table are the approximate actual shipping weights, including such ordinary skidding or boxing as is necessary for domestic transportation. But these weights often vary considerably on account of the variation in the castings.

Furthermore, the architectural jaw when put on adds several hundred pounds, up to perhaps 1,000 lbs. on the heaviest sizes. It should also be borne in mind that motor bracket and connections and other tools and attachments add to the weight.

For export and ocean shipments, the machines are boxed in heavy oak cases, which add also materially to the weight, from a few hundred up to two or three thousand pounds, depending on the size of machine.

On a medium-sized machine with a short throat, such additional weight of boxing will run approximately 800 or 1,000 lbs.

Note 13. The method of drive may be by belt, engine, or motor. Motors are frequently furnished, direct-connected. Right-angle drive or overhead drive will also be furnished at an extra cost.

Note 14. In case of motor drive, where we furnish bracket and connections without motor, it is necessary that we have a blue print of the motor dimensions, in order to make bracket and connections to suit. Also in such case the user after receiving machine must line up motor and drill holes in bracket to suit same, as we cannot make these adjustments or drill the holes here.

Where we furnish motor, we put it on complete ready for wiring, with usual starting box. Weights added from 500 up to 2,500 lbs.

Note 15. Spacing tables are practically special in nearly every case, made to suit the needs of the customer. They may be operated by hand or power, and are built in a variety of ways. Upon receipt of full information as to what is required, we will quote price and furnish drawing of such table as is suitable.

Note 16. In making inquiry, a customer should always specify fully the number of holes to be punched at one stroke, diameter of hole, thickness of metal, quality of metal, also the maximum size of bars to be sheared, and thickness of plate to be split.

Note 17. We have a printed list of punches, dies, stems and couplings, which is supplied to customers on application.

NO. 19 SINGLE END PUNCH AND SHEAR,
6" THROAT.



FIG. 11619.

For table of capacities, see following page.

STANDARD PUNCHING AND SHEARING MACHINES.

TABLE OF CAPACITIES.
FIGS. 11619 TO 11633.

Size of Machine	Punching.	Bar Shearing. See Note 3.	Splitting or Plate Shearing. See Notes 3, 4 and 5.	Angle Shearing. See Notes 3 and 5.	Slitting. See Note 5.	Depth of Throat. See Note 2.
No. 19	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	$2\frac{1}{2}$ " x $\frac{1}{2}$ "	$\frac{1}{4}$ " plate	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{4}$ "	$\frac{1}{4}$ "	0" only
No. 18	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	3" x $\frac{1}{2}$ "	$\frac{1}{2}$ " plate	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "	1"	0" and 10"
No. 17	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	3" x $\frac{1}{2}$ "	$\frac{1}{2}$ " plate	$2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $\frac{1}{2}$ "	$1\frac{1}{2}$ "	5", 12", 16", etc. See Note 2
No. 16	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	3" x $\frac{1}{2}$ "	$\frac{1}{2}$ " plate	$2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $\frac{1}{2}$ "	$1\frac{1}{2}$ "	5" and 12"
No. 15	$\frac{1}{2}$ " hole in $\frac{1}{2}$ "	3" x $\frac{1}{2}$ "	$\frac{1}{2}$ " plate	4" x 4" x $\frac{1}{2}$ "	$1\frac{1}{2}$ "	5", 12", 16", 20", etc. See Note 2
No. 14 $\frac{1}{2}$	1" hole in 1"	6" x 1"	$\frac{1}{2}$ " plate	6" x 6" x $\frac{1}{2}$ "	$1\frac{1}{2}$ "	9", 12", 15", 16", 20", etc. See Note 2
No. 14	$1\frac{1}{2}$ " hole in 1"	7" x 1"	$\frac{1}{2}$ " plate	6" x 6" x $\frac{1}{2}$ "	2"	10", 12", 15", 20", etc. See Note 2
No. 13	$1\frac{1}{2}$ " hole in 1"	8" x $1\frac{1}{2}$ "	1" plate	6" x 6" x $\frac{1}{2}$ "	$2\frac{1}{2}$ "	10", 12", 15", 20", etc. See Note 2
No. 12	$2\frac{1}{2}$ " hole in $1\frac{1}{2}$ "	8" x $1\frac{1}{2}$ "	$1\frac{1}{2}$ " plate	6" x 6" x $\frac{1}{2}$ "	$2\frac{1}{2}$ "	12", 15", 20", etc. See Note 2
No. 11	$2\frac{1}{2}$ " hole in $1\frac{1}{2}$ "	10" x $1\frac{1}{2}$ "	$1\frac{1}{2}$ " plate	8" x 8" x $\frac{1}{2}$ "	$3\frac{1}{2}$ "	15", 25", 30", etc. See Note 2
No. 10	$2\frac{1}{2}$ " hole in $1\frac{1}{2}$ "	10" x 2"	2" plate	8" x 8" x 1"	$3\frac{1}{2}$ "	20", etc. See Note 2
No. 9	$2\frac{1}{2}$ " hole in 2"	10" x $2\frac{1}{2}$ "	$2\frac{1}{2}$ " plate	8" x 8" x $1\frac{1}{2}$ "	$4\frac{1}{2}$ "	20", etc.

NO. 16 SINGLE PUNCH AND SHEAR,
10" THROAT.



FIG. 11620.

NO. 15 DOUBLE-END PUNCH AND SHEAR, SHORT THROATS.

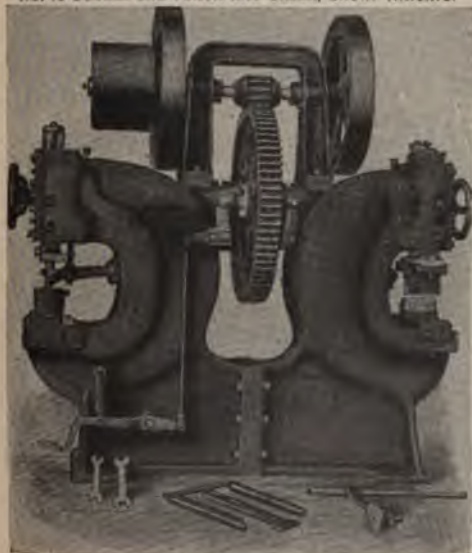


FIG. 11621.

SPECIAL RAPID-ACTION PUNCH AND SHEAR
20" THROAT.



FIG. 11622.

A quick-running single-ended punch and shear. Capacity, $\frac{1}{2}$ " hole in $\frac{1}{2}$ " iron. Other sizes will be furnished without gears, quick-running, as called for.

For general description see pp. 320 to 322.

STANDARD PUNCHING AND SHEARING MACHINES.

(For description and table of capacities, see pp. 320 to 323.)



FIG. 11623

Note: Fig. 11624 shows open-fronted bar shear type for shearing only. It will be noted that the lower jaw is cut away on the back side so that short cuttings will fall off. It will also be noted that the upper jaw on the back side is carried down to insure a long guide and support against the side strain of shearing so as to insure great rigidity. Also note the heavy gears. Made double-ended also. Note that all sizes of machines are made in this manner as called for.

NO. 16 SINGLE-END PUNCH AND SHEAR WITH DEEP THROAT.

SPECIAL OPEN END BAR SHEAR.

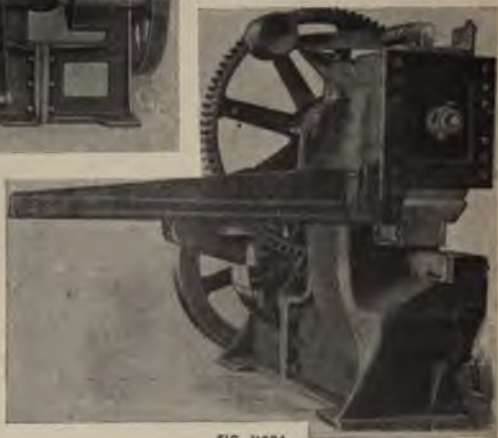


FIG. 11624.



FIG. 11625.

NO. 14 SINGLE-END PUNCH AND SHEAR, 25" THROAT.

Note: Fig. 11625 shows machine with architectural jaw. When filler block is removed the projecting steel die holder, shown at the left-hand side, lower end of the illustration, can be put on. It is used for punching flanges. Punching and shearing tools are interchangeable.

When filler block is replaced, shearing tools can be put on.

STANDARD PUNCHING AND SHEARING MACHINES.

(For general description and table of capacities, see pp. 320 to 323.)

NO. 14 SINGLE-END PUNCH AND SHEAR, MOTOR-DRIVEN.



FIG. 11826.

NO. 14½ DOUBLE-END PUNCH AND SHEAR, 25" THROATS, MOTOR-DRIVEN.

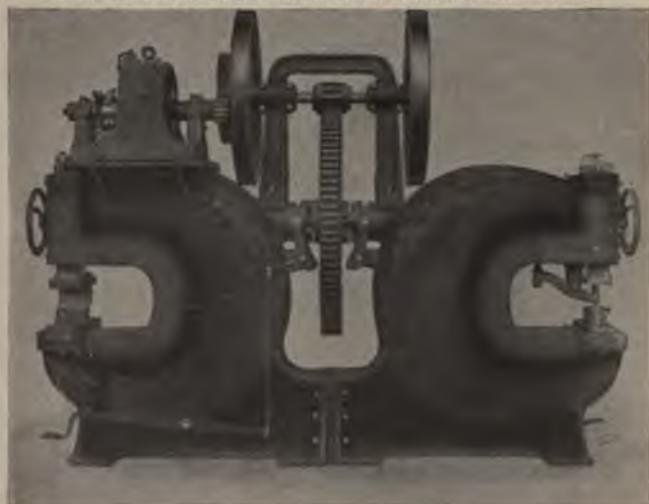


FIG. 11827.

STANDARD PUNCHING AND SHEARING MACHINES.

(For general description and table of capacities, see pp. 320 to 323.)

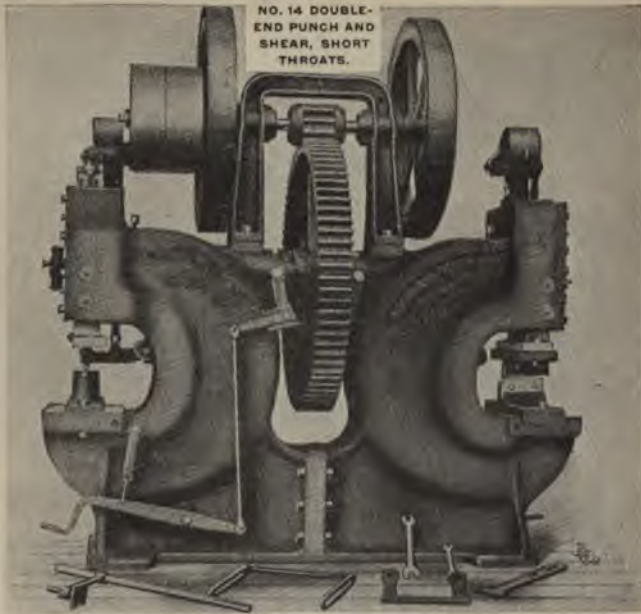


FIG. 1162B.

Fig. 1162B shows punching attachment on one end and standard attachment for shearing flat bars on the other end.

NO. 13 DOUBLE-END PUNCH AND SHEAR.

Plate shears on one end and punch on the other, but are interchangeable. On the right-hand end is shown the architectural jaw. When the filler block is removed the projecting steel die holder is put on for punching flanges.

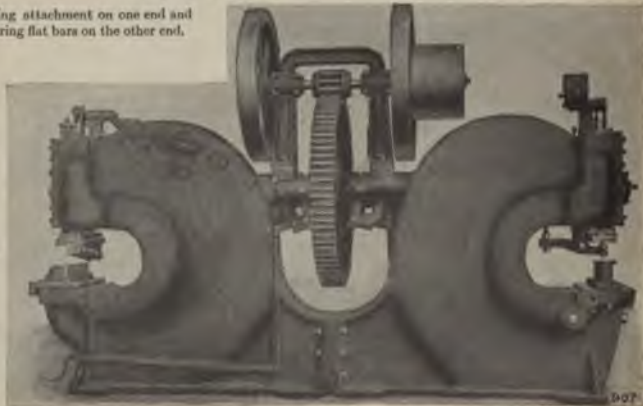
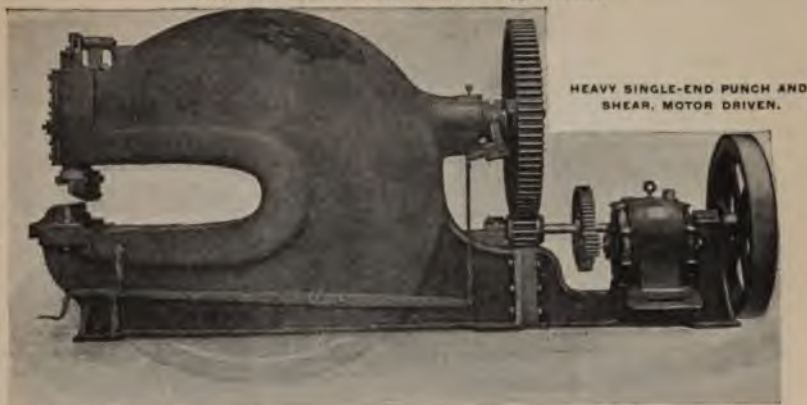


FIG. 1162O.

STANDARD PUNCHING AND SHEARING MACHINES.

(For general description and table of capacities, see pp. 320 to 323.)



HEAVY SINGLE-END PUNCH AND SHEAR, MOTOR-DRIVEN.

FIG. 11630.

This shows a very deep throat heavy punch, motor-driven, with plate or splitting shears in position. Punches can be used on the same machine, also bar shears, angle shears, and other tools.

EXTRA HEAVY DOUBLE-END DEEP THROAT PUNCH AND SHEAR, MOTOR-DRIVEN.

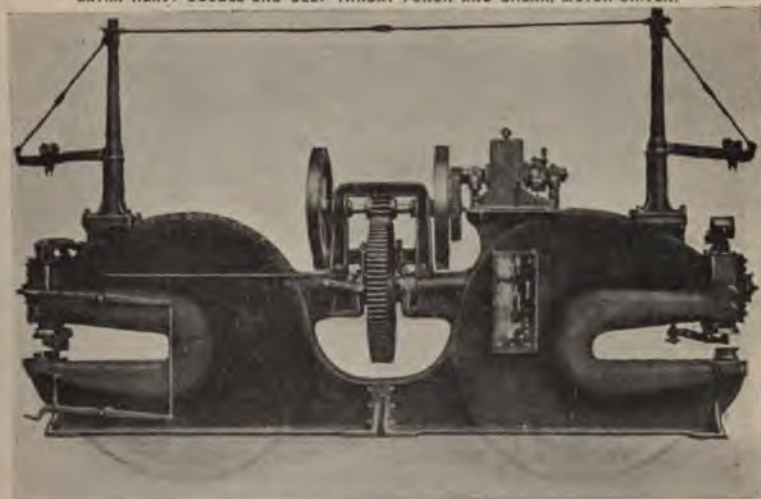


FIG. 11631.

This illustrates a very heavy deep throat punch and shear weighing approximately 100,000 lbs., motor-driven with starting panel. Also with cranes. Plate shears in position on the left-hand end, and punch on the right-hand end. All punching and shearing tools interchangeable. Built in all depths of throat and capacities.

STANDARD PUNCHING AND SHEARING MACHINES.

(For general description and table of capacities, see pp. 320 to 323.)

HEAVY SINGLE-END PUNCH WITH ARCHITECTURAL JAW, MOTOR-DRIVEN.

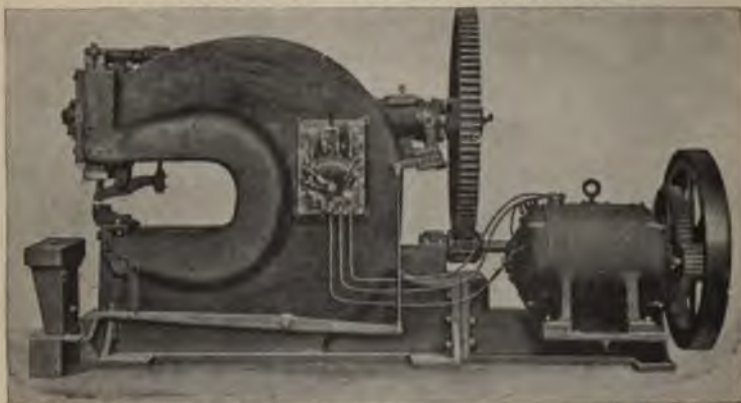


FIG. 11632.

PUNCHES AND SHEARS WITH SPACING TABLE.

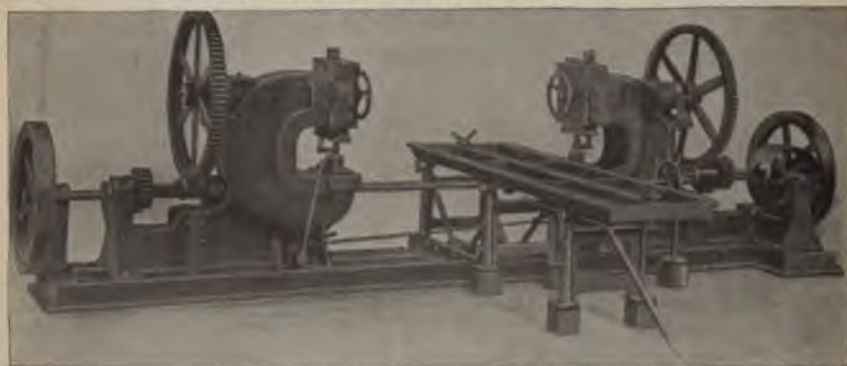


FIG. 11633.

This shows two machines mounted on one base, with spacing table between, designed to punch both edges of a sheet at the same time, either one or more holes on each side at the same time. The machine on the left-hand side is adjustable, by rack and pinion, back and forth, for different width of sheets. The spacing table as shown is hand operated; but spacing tables are also operated by power, if desired, and for heavy work it is preferable. Spacing tables will be fitted to any machine when called for, either hand or power operated.

SPECIAL PUNCHING AND COPING MACHINE.

DESCRIPTION FIG.
11634.

Single-ended coping and punching machine. Coping tools interchangeable with the punching tools. Made also double-ended and can be equipped with plate shears and bar shears and angle shears, or other tools if desired. Equipped when called for with double-ended coping dies for coping 24" beams, and smaller. Adjustable automatic stop-clutch. This style of machine is made in other sizes also. The punches are equipped with gag sockets, and are adjustable across the beam or plate. Further particulars will be sent on application.

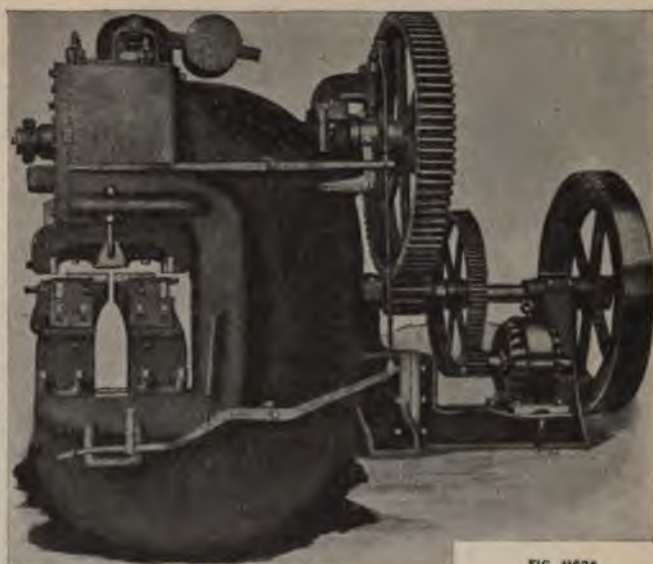


FIG. 11634.

MULTIPLE PUNCHING MACHINE.

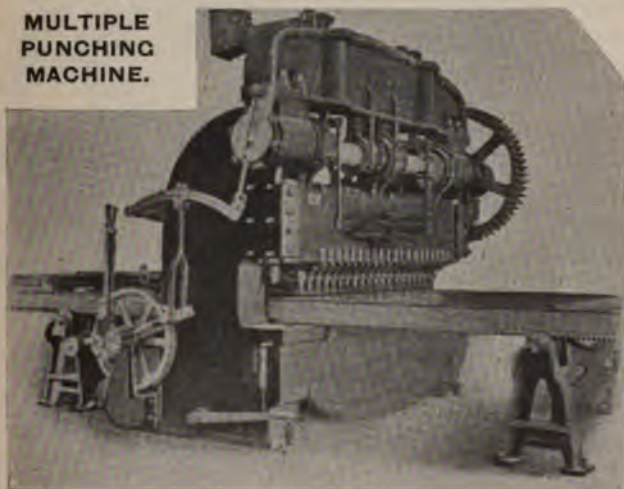


FIG. 11635.

DESCRIPTION FIG.
11635.

This is our No. 32 multiple punching machine with automatic spacing table and twenty punches and dies with gag sockets. Spacing table operates by power and the spacing is changeable or adjustable. The table has a quick return by power. The same machine is made without spacing table.

This is but one of a large variety of machines of this type, all of which can be specially built to suit individual requirements of purchaser.



FIG. 11636.

HORIZONTAL PUNCH.

DESCRIPTION FIG. 11636.

This illustrates a horizontal punch which we make in several sizes, and will be pleased to quote. Furnished with different depths of throat, belt drive or motor drive.

Further particulars will be sent upon application.

BAR AND BILLET SHEAR.

DESCRIPTION FIG. 11637.

This shows a large billet and bar shears for heavy work. This style of machine, and as illustrated also on the three following pages, is made in a variety of sizes, and also with vertical adjustment to the ram, if desired.

Same machine can be used for cutting angles with proper shears, but in that case when the machine is ordered, it should be specified in advance.

Made wider between housings, if called for.

The cut shows machine arranged for belt drive; it can, however, be fitted with electric motor drive if so desired.

Further particulars will be sent upon application.

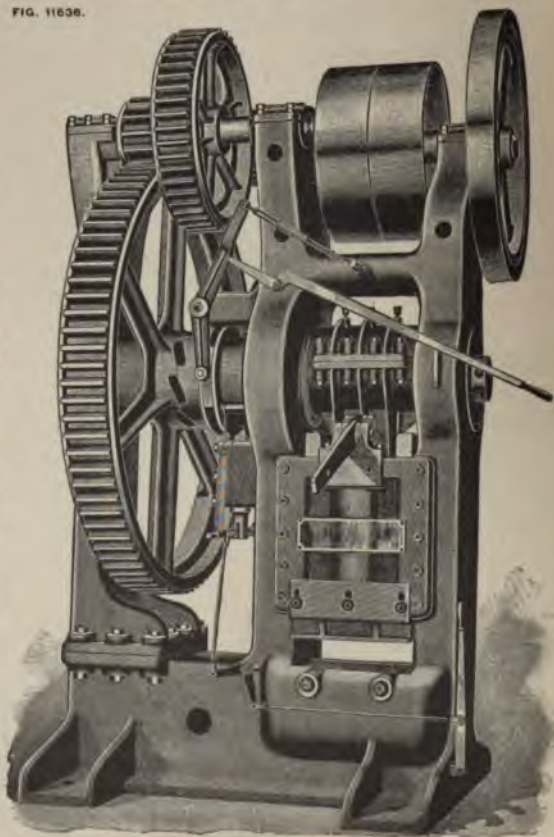


FIG. 11637.

GATE SHEAR.

DESCRIPTION FIG. 11638.

This shows what we call our No. 43 type of gate shear and punch. The illustration shows it equipped with a variety of shears, so that a variety of work can be done without changing. The machine can be adapted to quite a wide variety of purposes, also used for multiple punching.

Complete description of this or several other machines of similar type will be sent upon application.

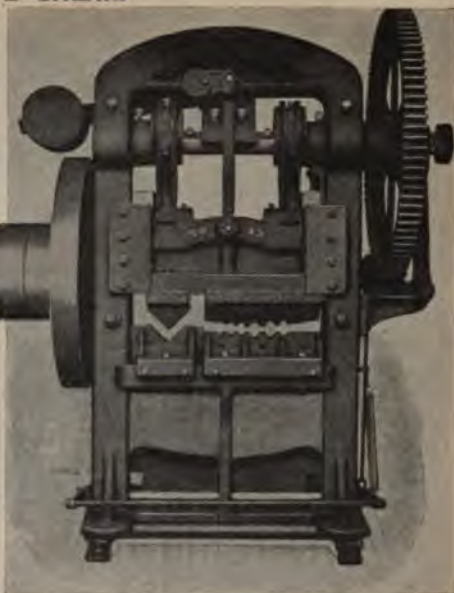


FIG. 11638.

ALLIGATOR SHEARS.



FIG. 11639.

A will shear $1\frac{1}{2}$ " x 3" flat bars.
A will shear 1" round.
Weight, 1,200 lbs.

B will shear 6" x $\frac{3}{4}$ " flat bars.
B will shear 1 $\frac{1}{2}$ " round.
Weight, 2,400 lbs.

C will shear 6" x 1" flat bars.
C will shear 2" round.
Weight, 4,000 lbs.

D will shear 8" x 1" flat bars.
D will shear 14" x $\frac{1}{4}$ " band iron.
D will shear 2 $\frac{1}{2}$ " round.
Weight, 6,800 lbs.

DESCRIPTION FIG. 11640.

This shows a double-end alligator shear of medium size, which we furnish to a number of our customers.

Full particulars will be sent on application.

DESCRIPTION FIG. 11639.

These shears are built in four sizes, as noted below.

11 C and 11 D are not fitted with clutch for stopping and starting, but can be fitted with clutch if so desired at a nominal extra charge.

DOUBLE-END ALLIGATOR SHEAR.

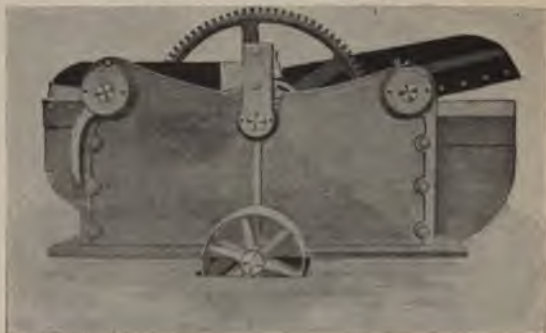


FIG. 11640.

ALLIGATOR SHEARS.

MOTOR-DRIVEN SHEAR.



FIG. 11641.

ENGINE-DRIVEN SHEAR.



FIG. 11642.

ENGINE-DRIVEN SHEAR.



FIG. 11643.

DESCRIPTION FIGS. 11641 TO 11644.

These shears are designed for heavy work. They are built in several sizes and style to suit varying conditions. In making inquiry care should be taken to state definitely the class of work to be performed, also whether machine is to be driven by pulley, steam

MOTOR-DRIVEN SHEAR.



FIG. 11644.

engine or electric motor. On receipt of such information full particulars of a machine best suited for the work will be sent.

DOUBLE ANGLE SHEARS.

BELT-DRIVEN,
WITHOUT
TURNABLE.



FIG. 11645.

MOTOR-DRIVEN,
WITH
TURNABLE.

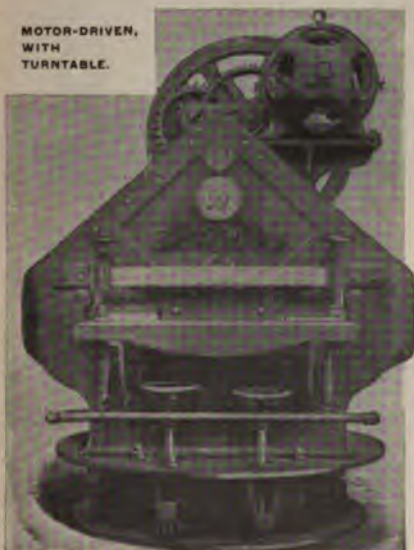


FIG. 11647.

DESCRIPTION FIGS. 11645 TO 11647.

The double angle shears shown by these illustrations are made in several sizes for work from the lightest up to the heaviest. They may be furnished with motor drive or belt drive, and with or without turntable, as desired. Only the motor-driven machines can be mounted on turntables. These machines are very heavy and thoroughly constructed, and have given ex-

MOTOR-DRIVEN, WITH TURNABLE.

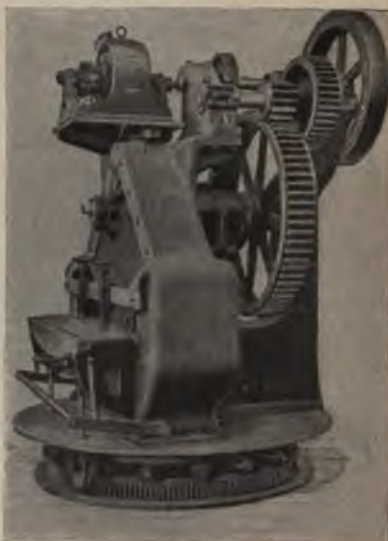


FIG. 11646.

DESCRIPTION FIGS. 11645 TO 11647.—Continued.

cellent satisfaction. The workmanship, and material throughout, and the design are the highest grade used in the construction of such machines. Rams are made of steel.

Full particulars will be sent on application.

PLATE BENDING ROLLS.

HAND POWER ROLLS.



FIG. 11648.

Size A.—Upper roll $4\frac{1}{2}$ " diameter, lower rolls $3\frac{1}{2}$ " diameter, built to take $4' 2"$ between housings only.

Size B.—Upper roll 5" diameter, lower rolls 4" diameter, built to take $4' 2"$ between housings only.

DESCRIPTION FIGS. 11648 AND 11649.

These rolls are built in several sizes and lengths and may be arranged to operate by hand power or supplied with pulleys for belt power, as desired. Electric motor drive can also be furnished to customers desiring to use this form of power.

BELT-POWER ROLLS.



FIG. 11649.

Size C.—Upper roll $5\frac{1}{2}$ " diameter, lower rolls $4\frac{1}{2}$ " diameter, built to take $5' 2"$ between housings only.

Size D.—Upper roll 6" diameter, lower rolls 5" diameter, built to take $5' 2"$ or $6' 2"$ between housings.

Size E.—Upper roll $6\frac{1}{2}$ " diameter, lower rolls 6" diameter, built to take $6' 2"$ between housings only.

Note: Special rolls not described here will be built to order.

BELT-DRIVEN ROLLS, 10" AND 8" DIAMETER.



FIG. 11650.

DESCRIPTION FIG. 11650.

These rolls are built in several sizes and lengths and may be arranged for belt drive as shown or fitted with electric motor drive, if desired.

Size F.—Upper roll 8" diameter, lower rolls 6" diameter, built to take $8' 2"$ between housings.

Size G.—Upper roll 8" diameter, lower rolls 7" diameter, built to take $6' 2"$ between housings.

PLATE BENDING ROLLS.

DESCRIPTION FIG. 11650.—Continued.

- Size H.—Upper roll 9" diameter, lower rolls 7" diameter, built to take 8' 2" or 10' 2" between housings.
 Size I.—Upper roll 9½" diameter, lower rolls 8" diameter, built to take 10' 2" between housings.
 Size J.—Upper roll 10" diameter, lower rolls 8" diameter, built to take 8' 2" or 10' 2" between housings.

Note: Special rolls not described here will be built to order.

BELT DRIVEN BENDING ROLLS.

HEAVILY GEARED.

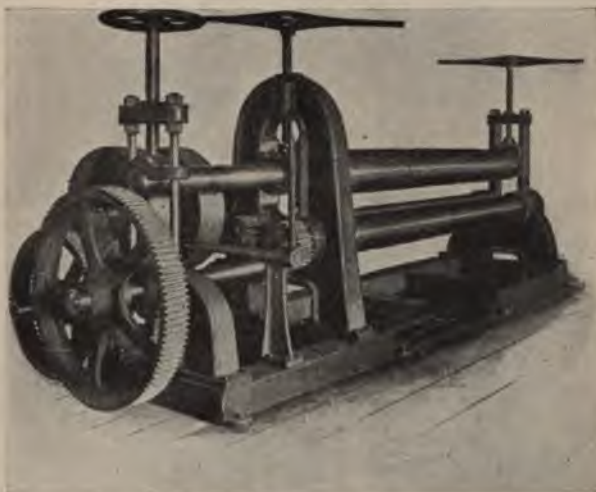


FIG. 11651.

DESCRIPTION FIG. 11651.

These rolls are designed for heavy work. They are strongly geared and driven by clutch pulleys. Electric motor drive can be supplied if desired.

- Size K.—Upper roll 11½" diameter, lower rolls 9" diameter, built to take 10' 2" between housings.
 Size L.—Upper roll 12" diameter, lower rolls 9" diameter, built to take 10' 2" between housings.
 Size M.—Upper roll 13" diameter, lower rolls 10" diameter, built to take 10' 2" or 12' 2" between housings.
 Size N.—Upper roll 13" diameter, lower rolls 10½" diameter, built to take 10' 2" or 12' 2" between housings.
 Size O.—Upper roll 14" diameter, lower rolls 11" diameter, built to take 12' 2" or 14' 2" between housings.
 Size P.—Upper roll 15" diameter, lower rolls 12" diameter, built to take 12' 2", 14' 2" or 16' 2" between housings.
 Size Q.—Upper roll 18" diameter, lower rolls 15" diameter, built to take 12' 2", 16' 2" or 18' 2" between housings.
 Size R.—Upper roll 20" diameter, lower rolls 16" diameter, built to take 12' 2", 16' 2", 18' 2" or 20' 2" between housings.

Note: In addition to the regular sizes above described we are prepared to furnish plate bending rolls of similar design of any special size or length to suit individual requirements. Weights and prices of standard and special rolls will be quoted on application.

PLATE STRAIGHTENING ROLLS.

HEAVY STRAIGHTENING ROLLS, DRIVEN BY STEAM ENGINE.



FIG. 11652.

DESCRIPTION FIG. 11652.

This is a solid type machine and can be driven either by engine as shown or by electric motor. It is built to handle any thickness of plate, from the lightest gauge with 21 rolls to the heaviest with 7 or 5 rolls, in widths up to 14'. Bearings are of bronze, gearing is all cut from the solid and rolls are balanced independently and provided with independent adjustment. Specifications and prices will be sent on receipt of specific inquiries, stating nature of work to be performed.

OPEN TYPE STRAIGHTENING ROLLS.



FIG. 11653.

DESCRIPTION FIG. 11653.

This machine is similar to that shown in Fig. 11652, but is of the open type, which is more desirable for hard service, as repairs are more easily effected. Specifications and prices will be sent on application.

FLUE WELDING MACHINE.

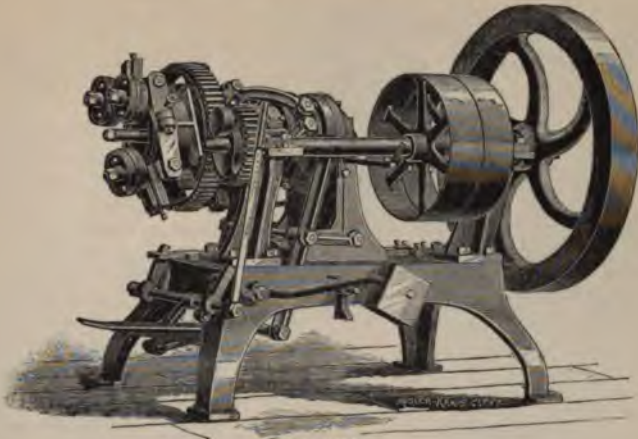


FIG. 11654.

DESCRIPTION FIGS. 11654 TO 11657.

The class of trade for which this machine is especially designed are aware of the necessity of rapidity in joining and welding the flues of locomotive and other boilers. With proper heating capacity the machine will successfully handle from ninety to one hundred 2" flues per day (see illustrations below) skilled labor not being essential to its proper workings. Each operation is only limited in capacity by the heating efficiency. The machine has been on the market for years and is built to do the work in three operations and to do each operation properly, i. e., scarfing, cutting off jag ends and spreading simultaneously and welding. Will also swedge for ferrules with special rollers.

FIRST OPERATION, SCARFING.



FIG. 11655.

SECOND OPERATION, SPREADING.



FIG. 11656.

Contrary to claims made for inefficient machines wherein welding only is done, the preparing of joints is most particular. With well fitted joints, smooth so no slack or dirt can get between while heating to weld (as can be done on our machine), the welding operation is in itself the simplest.

The lap should be from $\frac{1}{4}$ " to $\frac{3}{8}$ " which through many years' experience we know to be the most satisfactory and will roll down so smooth it is almost impossible to detect the weld. Our machine is the only one on

the market that does work that is accepted by the United States government in preference to hand work.

The machine is substantial and lasting, weighing 2,400 lbs., and those we built years ago are being operated to-day.

Tools for the three operations and one set of formers for working 2" flues are furnished with each machine, but the machine will handle sizes ranging from $1\frac{1}{2}$ " to 5" flues inclusive and extra mandrels, formers, etc., will be furnished at reasonable prices.

THIRD AND LAST, WELDING.



FIG. 11657.

PIPE CUTTERS.

ROLLER PIPE CUTTER.



FIG. 11656.

DESCRIPTION FIG. 11659.

NOS. 1, 2 AND 3 MACHINES.

These machines are designed for cutting light tubing such as bicycle tubing, etc. On the No. 1 machine the driving pulley is geared on the cutter shaft, so that this machine will cut any length stock either side of the cutter disk, while on the No. 2 and 3 machines the pulley is on the same shaft with the cutter, limiting the length of cut to the length of the machine. The capacity of the Nos. 1, 2, and 3 machines, is light tubing $\frac{1}{2}$ " to 2" outside diameter (1 $\frac{1}{2}$ " 22 gauge hard tube may be cut in 4 seconds). The No. 1 machine cuts any length; shipping weight 145 lbs. The No. 2 machine cuts up to 60" long; shipping weight 210 lbs. No. 3 machine cuts 30" long; shipping weight 130 lbs. Tight and loose pulleys, 8" x 2 $\frac{1}{4}$ "; revolutions, 175.

NO. 5 PIPE CUTTER.

This machine was designed to fill a demand for a heavier machine for cutting heavy tubing and pipe to length quickly and accurately. This machine cuts any length stock either side of the cutter disk. The lower rolls are carried in an adjustable bearing block which is elevated and lowered by the hand wheel shown on the end of the machine. The proper adjustment is that which brings the pipe just clear against the rotary cutter, quickly separating the tubing.

Upon actual test, an ordinary piece of 1" steam pipe was cut in 10 seconds, and a piece of 1 $\frac{3}{4}$ " pipe in 30 seconds. One extra cutter disk is furnished with each machine. Tight and loose pulleys 12" x 3"; revolutions, 450. No countershaft required. Floor space 18" x 48". Shipping weight, 550 lbs.

Small pipe attachment.—If it is desired to cut smaller than $\frac{1}{2}$ " pipe this machine may be furnished with an attachment for cutting $\frac{1}{8}$ ", $\frac{3}{8}$ ", and $\frac{1}{2}$ " pipe. This attachment consists of a block carrying two smaller bearing rollers, which are substituted in place of the regular rollers when desired.

In ordering specify whether the machine is desired with or without the small pipe attachment.

DESCRIPTION FIG. 11658.

These roller pipe cutters are adapted for rapid cutting of pipe from $\frac{1}{8}$ " to 2", are fitted with either lever attachment or hand wheel and quick acting screw motion; and will cut off pipe for close nipples to pieces 9' long.

These machines are fitted with hardened tool steel rollers, with internal roller bearings running on a hardened steel pin, and cutting-off knife is made of best tool steel, carefully tempered; has gauge bar running entire length of machine with an additional adjustable clamp which is easily set for different lengths of pipe to be cut. Machine is thoroughly built in every respect, and is fitted with tight and loose pulleys.

Speed 200 revolutions per minute.

No. 1 roller cutter, for $\frac{1}{8}$ ", $\frac{1}{4}$ " and $\frac{3}{8}$ " pipe.

No. 2 roller cutter, for $\frac{1}{2}$ " to 2" pipe.

These machines can be built to any length to suit shop conditions or other requirements, and for special price we can furnish one machine to cut all sizes from $\frac{1}{8}$ " to 2" inclusive.

NO. 5 PIPE CUTTER.



FIG. 11659.

PIPE CUTTING-OFF MACHINES.

DESCRIPTION FIG. 11660.

Cutter is circular, is revolved when brought in contact with pipe, attached to sliding head which has vertical movement by hand wheel, worm gear, and rack.

Feed rolls are revolved by gearing connecting with pulley shaft, making 105 and 90 revolutions per minute.

Will cut pipe from 0 to 3" in diameter.

Weight, 1,500 lbs.

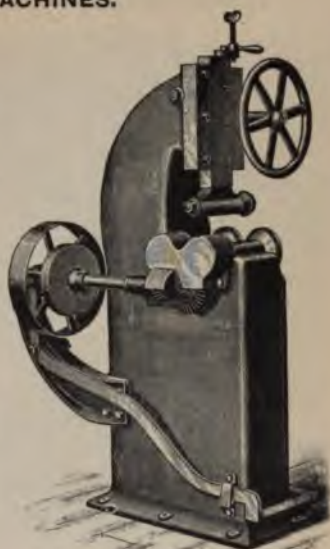


FIG. 11660.

PIPE STRAIGHTENER.

THE FAIRBANKS COMPANY



FIG. 11661.

DESCRIPTION FIG. 11661.

Rotary pipe cutter for cropping ends of pipe from 4" up to 30" or 36" diameter, built for belt or motor drive. It is a powerful, accurate machine and will cut off pipe edges absolutely straight without fins either inside or outside and will save cost of itself in saving scrap, as the operator can see exactly where he is cutting, which is possible with no other type of machine.

PIPE STRAIGHTENING MACHINE.

DESCRIPTION FIG. 11662.

Very strong and rigid and powerful. Will straighten pipe up to 3" Is driven by spur gear and pinion operating plunger, which presses pipe between dies. Arranged to be driven from main shaft.



FIG. 11662.

PIPE THREADING AND CUTTING-OFF MACHINES.



FIG. 11663.

DESCRIPTION FIG. 11664.

NOS. 8N AND 11N COMBINED HAND AND POWER MACHINES.

Each machine is supplied with countershaft, also ratchet for hand power, cutting-off device, right hand chasers, oil pump and rear pipe rest.

	No. 8N	11N.
Capacity.....	2½" to 8"	4" to 12"
Countershaft pulleys..	12" x 3"	14" x 5"
Speed of countershaft, revolutions.....	300	300
Net weight.....	1,540 lbs.	3,300 lbs.
Weight, boxed.....	2,100 lbs.	4,200 lbs.

DESCRIPTION FIG. 11663.

NOS. 6N AND 6K COMBINED HAND AND POWER MACHINES.

Each machine is supplied with countershaft for belt power, ratchet for hand power, cutting off device, and right hand chasers to thread all sizes of pipe within its capacity as noted below. Oil pump can be furnished at extra cost.

No. 5½ Machine.—Capacity 1" to 4". Countershaft has pulleys 12" x 3", and should run 300 revolutions per minute. Net weight, 725 lbs. Weight, boxed, 1,175 lbs.

No. 6½ Machine.—Capacity 1" to 6". Countershaft has pulleys 12" x 3", and should run 300 revolutions per minute. Net weight, 1,310 lbs. Weight, boxed, 1,840 lbs.



FIG. 11664.

PIPE THREADING AND CUTTING-OFF MACHINES.

DESCRIPTION FIG. 11665.

Any of the machines shown in Figs. 11663 and 11664 can be supplied with direct current motor drive as shown in this illustration. In this event the countershaft and hand ratchet are of course omitted. In all other particulars the motor driven machines are the same as the combined hand and power machines.



FIG. 11665.

NO. 7 POWER PIPE MACHINE.



FIG. 11666.

DESCRIPTION FIG. 11666.

This machine has capacity for threading and cutting off pipe from $\frac{1}{4}$ " to 2" inclusive. It is regularly furnished with quick opening, adjustable dies, right hand, for threading all diameters of pipe from $\frac{1}{4}$ " to 2" inclusive. Countershaft, oil pot and cutting-off attachment. A crank is also provided for operating the machine by hand power. When desired, an automatic oil pump is supplied at extra cost. Attachments for threading bolts and tapping nuts, as shown on pages 344 and 345 can also be furnished.

Countershaft has three pulleys, one tight and two loose, 12" diameter for 3" belt.

Speed of countershaft, 200 revolutions per minute.

Cone has three steps for 3" belt.

Floor space 2' 4" x 4'

Weight, 575 lbs.

PIPE THREADING AND CUTTING-OFF MACHINES.

NO. 7B POWER PIPE MACHINE.

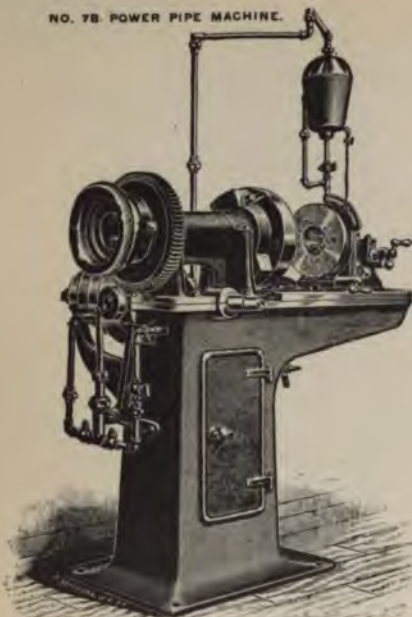


FIG. 11667.

DESCRIPTION FIG. 11666.

These machines are furnished with right hand, quick opening, adjustable dies for all sizes of pipe within the limits of their capacities as below noted, cutting off attachment, oil pump and countershaft. Solid die attachment, nipple holder and bolt and nut attachments as shown on page 344 can be supplied at extra cost.

	No. 9.	No. 11.
Capacity.....	1" to 4"	1½" to 6"
Countershaft pulleys*.....	14" x 4"	14" x 4"
Speed of countershaft, revolutions per minute.....	200	200
Floor space.....	3' x 6'	3' 3" x 6'
Weight.....	2,300 lbs.	2,650 lbs.

* One tight and two loose pulleys.

DESCRIPTION FIG. 11667.

Machine has capacity for threading and cutting off pipe from ¼" to 3" inclusive. It is regularly furnished with right hand, quick opening, adjustable dies to handle all sizes of pipe within this range, cutting-off attachment, oil pump and countershaft. Solid die attachment, nipple holder and attachments for threading bolts and tapping nuts, as described on page 344 can be supplied at extra cost. Countershaft has one tight and two loose pulleys, 14" x 4" and should run 200 revolutions per minute. Cone has four steps for 3½" belt. Floor space, 3' x 4'. Weight, 1,325 lbs.

NOS. 9 AND 11 POWER PIPE MACHINES.

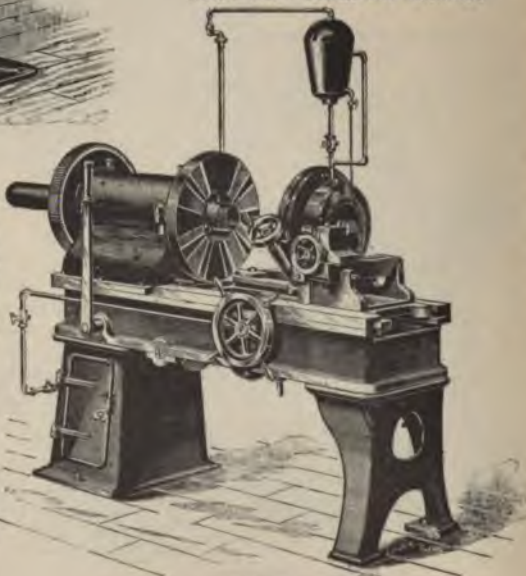


FIG. 11668.

THE FAIRBANKS COMPANY

PIPE THREADING AND CUTTING-OFF MACHINES.

NOS. 13 AND 17
POWER
PIPE MACHINES.



FIG. 11669.

DESCRIPTION FIG. 11669.

These machines are furnished with full set of right-hand, quick-opening, adjustable dies for threading all sizes of pipe within the capacities below mentioned, cutting-off attachment, oil pump and countershaft. Nipple holder, shown on page 344, can be supplied at extra cost.

	No. 13.	No. 17.
Capacity.....	2½" to 8"	2½" to 12"
Countershaft pulleys*..	18" x 4"	18" x 4"
Speed of countershaft, revolutions per minute.....	200	200
Floor space.....	3' 8" x 8' 3"	4' x 10'
Weight.....	7,000 lbs.	9,000 lbs.

* One tight and two loose pulleys.

DESCRIPTION FIG. 11670.

All sizes of machines shown in Figs. 11666 to 11669 inclusive can be fitted with electric motor drive as here shown, when so desired. In making inquiry for prices of motor-driven machines, care should be taken to state the nature of electric current available at the place where machine is to be installed.

NO. 7 PIPE MACHINE,
MOTOR-DRIVEN.

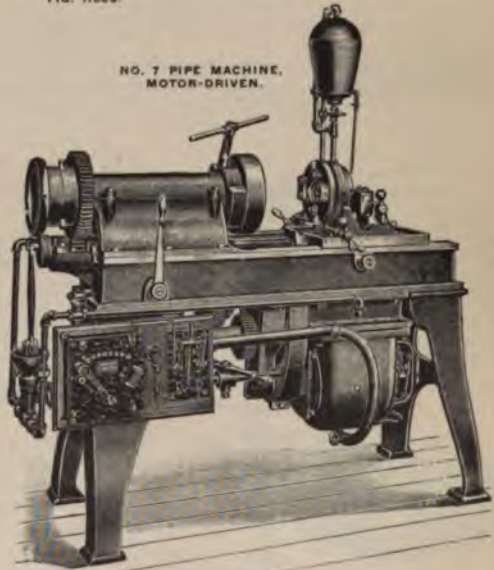


FIG. 11670.

PIPE THREADING AND CUTTING-OFF MACHINES.

SOLID DIE HOLDER.

DESCRIPTION FIG. 11671.



FIG. 11671.

Suitable for use on machines shown on preceding pages.

The solid die holder can be attached to machines by first removing the die head cover and adjustable dies from die head. The solid die frame is for the purpose of using $2\frac{1}{2}$ " x $\frac{1}{4}$ " dia. 1" and smaller in solid die holder.

For pipe machine, Nos. 7 7B 9 11

Range of sizes, solid dies $\frac{3}{8}$ " to 2" $\frac{3}{8}$ " to 2" $\frac{1}{2}$ " to 2" $1\frac{1}{4}$ " to 2"

NIPPLE HOLDER.

DESCRIPTION FIG. 11672.

Suitable for use on machines shown on preceding pages.

Place shank part of nipple holder into pipe gripping chuck. Screw nipple which is to be threaded into collar as shown in cut, then drive in the wedge lightly. To remove nipple, drive wedge back, which releases the plunger, allowing nipple to be removed by hand.

A complete nipple holder consists of one shank only, and separate collars for each size of nipple, the collars all being threaded to fit the same size shank.

No.	1	2	3	4	5	6
Takes . . .	$\frac{1}{4}$ " to $1\frac{1}{4}$ "	$1\frac{1}{2}$ " to 2"	$\frac{1}{4}$ " to 2"	$\frac{1}{4}$ " to 3"	$2\frac{1}{2}$ " to 4"	1" to 4"
No.	7	8	9	10	11	
Takes . . .	$4\frac{1}{2}$ " to 6"	$2\frac{1}{2}$ " to 6"	$4\frac{1}{2}$ " to 8"	7" to 10"	7" to 12"	



FIG. 11672.

BOLT THREADING DIES.

DESCRIPTION FIG. 11673.



FIG. 11673.

These dies can be supplied to fit No. 7 and No. 7B pipe machines shown in Figs. 11666 and 11667. They are often a very useful accessory, especially in a jobbing shop, where the work is of a variable character. Dies can be furnished to thread the following diameters, viz.: $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{5}{16}$ ", $\frac{3}{16}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", $1\frac{5}{8}$ ", $1\frac{3}{4}$ ", $1\frac{7}{8}$ ", and 2", either V or United States standard thread.

DESCRIPTION FIGS. 11674 AND 11675.

For use with No. 7 and No. 7B pipe machines shown in Figs. 11666 and 11667. Taps can be furnished for either V or United States standard thread in diameters as follows viz.: $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{5}{16}$ ", $\frac{3}{16}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", $1\frac{5}{8}$ ", $1\frac{3}{4}$ ", $1\frac{7}{8}$ ", and 2". A separate socket is required for each diameter of tap.

NUT TAP.

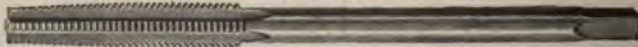


FIG. 11674.

TAP SOCKET.

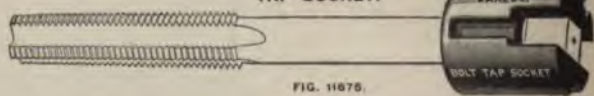


FIG. 11675.

NUT GRIPPING CHUCK.

DESCRIPTION FIG. 11676.



FIG. 11676.

This chuck is for use on all sizes of pipe machines shown in Figs. 11666 to 11670 inclusive. It is interchangeable with the die head cover and pipe dies regularly furnished with the machine. Chuck for No. 7 machine holds nuts up to $1\frac{1}{2}$ " diameter, and for larger machines up to 2" diameter.

PIPE THREADING AND CUTTING-OFF MACHINES.

DIE HEAD AND CHUCK.

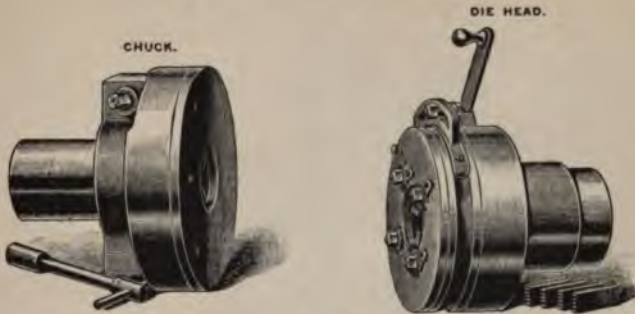


FIG. 11677.

DESCRIPTION FIG. 11677.

When it is desired to thread bolts on the No. 9 and No. 11 pipe machines (Fig. 11668), it is necessary to use both of these attachments. They can also be used for threading pipe of smaller diameter than that which will be handled by the regular machine. Each die head is regularly furnished with V or United States standard bolt dies from $\frac{3}{8}$ " to 2" inclusive, but pipe dies may be substituted, if desired.

B AND K NO. 2 IMPROVED PIPE MACHINE.



FIG. 11678.

DESCRIPTION FIG. 11678.

This machine is designed to meet the demand for a good, strong, quick acting combination pipe and bolt threading machine at a reasonable price. It will cut and thread all sizes of pipe from $\frac{1}{4}$ " to 2" and bolts $\frac{1}{4}$ " to 2". The bed is long and travel of carriage ample. The chuck is of the universal type and very strong. With a special nut grip, and a chuck with shank for holding tap, nuts can readily be tapped on the machine.

Regular equipment consists of right hand pipe dies to thread from $\frac{1}{8}$ " to 2" inclusive, cutting off attachment, automatic oil pump and countershaft having pulleys 12" x 3" which should run 260 revolutions per minute. Bolt dies and holder for solid dies are supplied at extra cost only.

This machine can be furnished to operate by hand power if so desired.

Weight, 1,000 lbs.

Floor space, 24" x 36".

PIPE THREADING AND CUTTING-OFF MACHINES.

PEERLESS NO. 4 IMPROVED PIPE MACHINE.

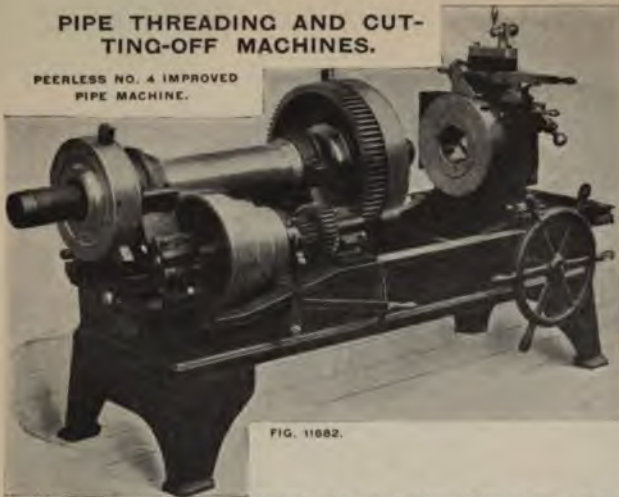


FIG. 11682.

DESCRIPTION FIG. 11682.

This machine has the Peerless adjustable die head, which is an easily operated and perfect mechanism, besides being strong and durable. Any degree of accuracy may be obtained, as the micrometer screw enables adjustment to the 1-1000 part of an inch, and as nothing but the moving of the nut on this screw can change the gauge, any number of duplicate threads can be cut. There is no backing off of the pipe after the thread has been cut. The lever is raised, expanding the dies and the carriage withdrawn.

The pipe is firmly gripped by the universal chuck jaws on the front of the arbor; the rear end of arbor is equipped with a quick-acting scroll-chuck that brings the pipe into alignment with the dies. This machine also has a long arbor, so that it is not necessary to use an out-bearing stand.

The gears are all machine cut from the solid, and with the sliding gears and a three-step cone pulley six speeds are obtainable.

All machines are furnished with an automatic oil pump, which keeps a constant stream of oil on the dies and cutting-off knife. In threading pipe $2\frac{1}{2}$ " and under, always use the bushing to stiffen the dies.

Regular equipment consists of right hand dies for pipe from 1" to 4", countershaft and wrench.

Capacity of machine.....	1" to 4"	Size of tight pulleys.....	$3\frac{1}{2}$ " face x 14" diameter
Size of die steel.....	$1\frac{1}{2}$ " x $\frac{3}{4}$ "	No. of speeds.....	6
Speed of countershaft, revs. per minute.....	250	Floor space.....	28" x 70"
Size of loose pulleys.....	7" face x 14" diameter	Weight.....	2,500 lbs.

DUPLEX NO. 6 IMPROVED PIPE MACHINE.

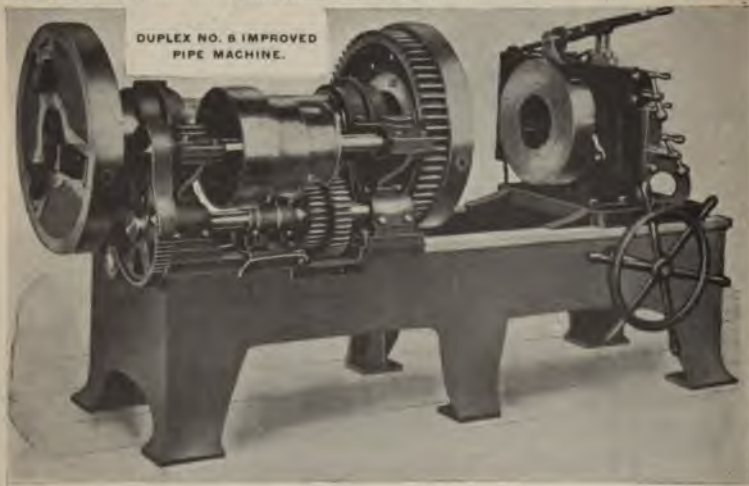


FIG. 11683.

Description on following page.

PIPE THREADING AND CUTTING-OFF MACHINES.

DUPLEX NO. 10 IMPROVED PIPE MACHINE.

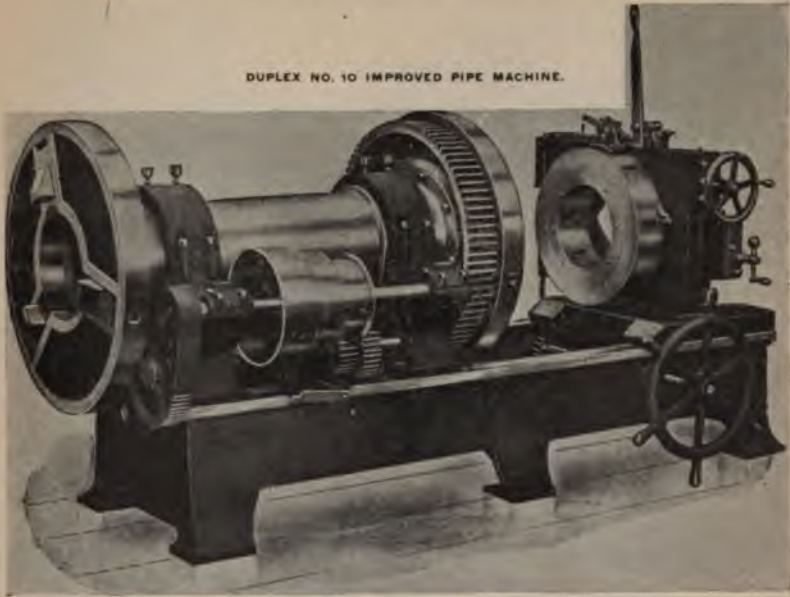


FIG. 11884.

DESCRIPTION FIGS. 11883 TO 11885.

Casing dies can be furnished for all standard sizes within the capacity of the machine, and may be substituted for standard pipe dies or furnished extra.

The gears are all machine cut, from solid metal, and great care has been taken to give them ample strength to sustain the most severe service.

The chucks are massive and identical in design, each having three independent jaws operated by powerful screws. Tempered steel grips are dovetailed into the ends of the jaws; these can be readily removed and re-sharpened. As the jaws are graduated on the face they can be easily set for any size of pipe.

Special flange grippers are placed on the outside of the jaws of the rear chuck. They will be found very convenient when making up flanges or flanged fittings.

The die head is heavy and substantial and is equipped with the Peerless adjusting mechanism, which is exceedingly simple and yet absolutely accurate. Duplicate threads of exact gauge can always be obtained and the gauge can be varied by 1-1000 of an inch. All adjustments are made by hand and the dies are inserted in the head without removing any of the parts.

The cutting-off tool and steady slides are on the back of the die stand, the latter being equipped with interchangeable steel facings. An automatic oil pump is placed in the bed of the machine and the oil is delivered directly to the dies and cutting-off tool.

The cone pulley has three steps, and by means of a compound shifting gear two speeds for the arbor can be obtained from each step of the pulley.

The bearings are all of ample proportions, and well babbitted, and all wearing parts are large and accurately fitted.

For table of capacities and specifications see following page.

PIPE THREADING AND CUTTING-OFF MACHINES.

DUPLIX NO. 16 IMPROVED PIPE MACHINE.

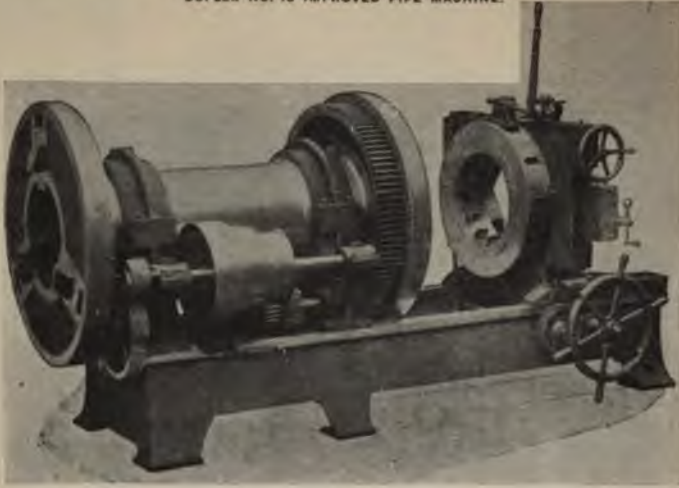


FIG. 11685.

SPECIFICATIONS FIGS. 11682 TO 11685.

	No. 6.	No. 8.	No. 10.	No. 12.	No. 14.	No. 15.
Capacity.....	1½" to 6"	2½" to 8"	3½" to 10"	4" to 12"	7" to 16"	7" to 18"
Number of sets of dies furnished.....	10	9	9	9	8	8
Number of chasers per set of dies.....	6	6	8	8	12	12
Size of two loose pulleys on countershaft.....	16" x 8"	16" x 8"	18" x 8"	18" x 8"	18" x 10"	18" x 10"
Size of tight pulley on countershaft.....	16" x 4"	16" x 4"	18" x 4"	18" x 4"	18" x 5"	18" x 5"
Speed of countershaft, revolutions per minute.....	250	250	250	250	250	250
Floor space.....	37" x 96"	38" x 100"	42" x 122"	43" x 120"	51" x 132"	51" x 132"
Weight.....	3,850 lbs.	5,500 lbs.	7,300 lbs.	9,000 lbs.	11,500 lbs.	12,000 lbs.

TAPPING MACHINE CRANK CHUCKS.

DESCRIPTION FIG. 11686.

This chuck was designed for holding pipe fittings for tapping, but is useful for other purposes as well.

No. 2 holds pipe fittings ¾" to 3".

No. 3 holds pipe fittings ½" to 6".

No. 4 holds pipe fittings 1" to 8".



FIG. 11686.

BOLT CUTTING MACHINES.

NO. 1 HAND BOLT CUTTER.

DESCRIPTION FIG. 11687.

Capacity: Cuts $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ".
Weight, 275 lbs.

Each machine is furnished with tap chuck, wrench and solid die holder, and can be supplied in three styles, as follows:

- A. Without taps and dies.
- B. With taps and solid dies.
- C. With taps and adjustable dies.

Note: This machine can also be furnished without legs, to mount on bench, if so desired.

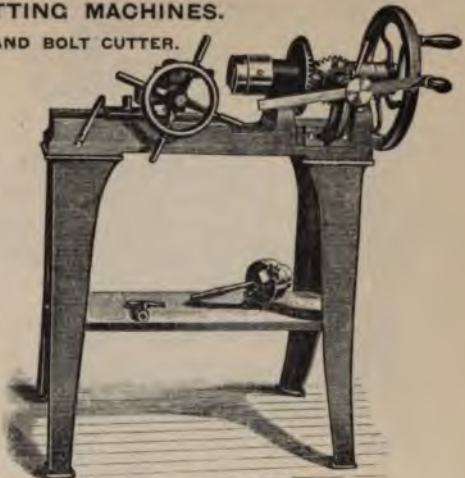


FIG. 11687.

NO. 1 IMPROVED POWER BOLT CUTTER AND NUT TAPPER.

WITH SINGLE PULLEY AND COUNTERSHAFT.

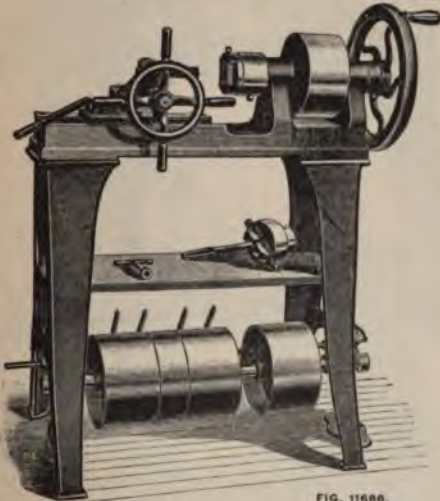


FIG. 11686.

DESCRIPTION FIG. 11686.

Designed especially for threading work from $\frac{1}{4}$ " to $\frac{1}{2}$ " inclusive, either right or left hand. Cone, $5\frac{1}{2}$ ", $7\frac{1}{2}$ ", and $9\frac{1}{2}$ " in diameter for $2\frac{1}{2}$ " belt. Speed of countershaft with 16×4 pulleys, 200 revolutions per minute.

Floor space, $3' 4"$ by $1' 10"$.
Gross weight, 1,400 lbs. Net weight, 1,100 lbs.
Boxed measurements, $3' 10"$ by $2' 4"$ by $3' 10"$.
Machine is regularly supplied with pump, countershaft, wrenches, automatic die head and five sets of cap dies, one set each, $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ".
Note: Assortment of dies can be changed to suit requirements.

DESCRIPTION FIG. 11688.

Capacity: Cuts $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ".
Weight, 350 lbs.
Size of pulley on spindle, $8" \times 4"$.
Size of driving pulleys on countershaft, $9" \times 5"$.
Each machine is furnished with tap chuck, wrench, and solid die holder, and can be supplied in three styles, as follows:
A. Without taps and dies.
B. With taps and solid dies.
C. With taps and adjustable dies.
Note: Machine can be furnished without legs, to mount on bench, if desired.

$\frac{1}{2}$ " SINGLE BOLT CUTTER.
CLASS A.



FIG. 11689.

NO. 1 POWER BOLT CUTTER AND NUT TAPPER.
With Cone and Countershaft.

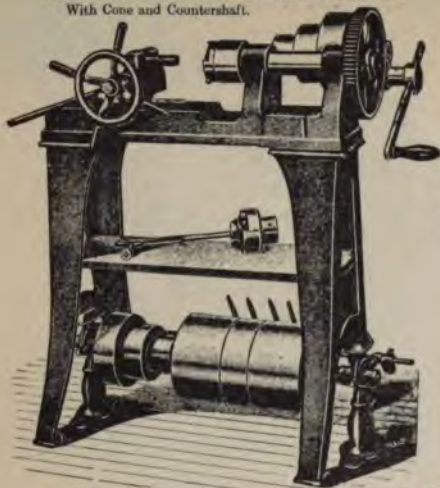


FIG. 11690.

DESCRIPTION FIG. 11691.

Capacity: Cuts $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1 ", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ".
Weight, 345 lbs.
Regular equipment includes tap chuck, wrench and solid die holder.
Machine is furnished in five styles, as follows:
A.—Without taps and dies.
B.—With taps and solid dies, $\frac{1}{4}$ " to $1\frac{1}{4}$ ".
C.—With taps and solid dies, $\frac{1}{4}$ " to $1\frac{1}{4}$ ".
D.—With taps and adjustable dies, $\frac{1}{4}$ " to $1\frac{1}{4}$ ".
E.—With taps and adjustable dies, $\frac{1}{4}$ " to $1\frac{1}{4}$ ".
Power attachment, consisting of two-step cone pulley and countershaft, can be supplied at extra cost.

NO. 2. HAND BOLT CUTTER AND NUT TAPPER.
On Short Legs.

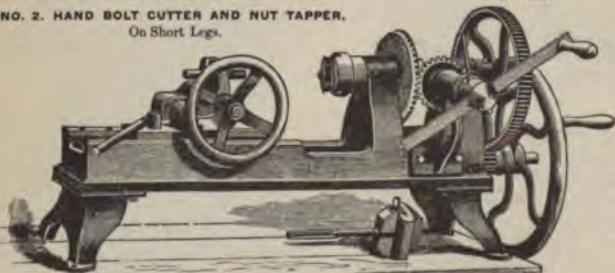


FIG. 11692.

DESCRIPTION FIG. 11692.

This machine is of the same capacity and can be furnished in the same styles as machine shown in Fig. 11691. The only difference being that it has short legs, making it suitable to mount on a bench.
Weight, 225 lbs.

BOLT CUTTING MACHINES.

DESCRIPTION FIG. 11690.

Capacity: Cuts $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ".
Speed for countershaft, about 175 turns per minute.
Tight and loose pulleys, $9" \times 5"$.
Cone pulley, 3-step, $7\frac{1}{2}"$, $5\frac{3}{4}"$, $4"$, for $2\frac{1}{2}"$ belt.
Equipment includes tap chuck, wrench and solid die holder.

The attachment to enable this machine to be used by hand is frequently of service on repair work when power is not available. It can be easily removed when not in use.

Weight, 375 lbs.

Machine is furnished in three styles, as follows:

- A.—Without taps and dies.
- B.—With taps and solid dies.
- C.—With taps and adjustable dies.

NO. 2 HAND BOLT CUTTER AND NUT TAPPER.

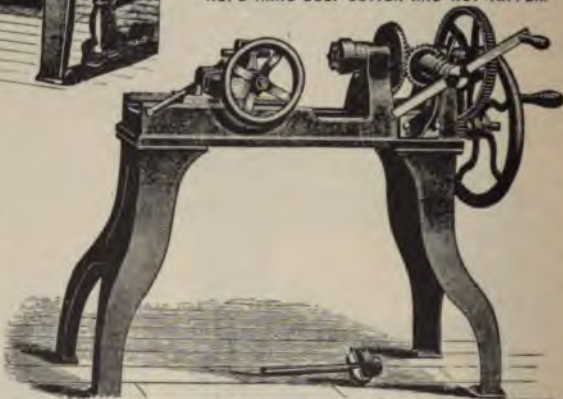


FIG. 11691.

BOLT CUTTING MACHINES.

1" AND 1 1/4" SINGLE BOLT CUTTERS.
CLASS A.

DESCRIPTION FIG. 11693.

1" MACHINE.

Suitable for threading and tapping 1/4" to 1", either right or left hand. Cone, 8", 10", and 12" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 250 revolutions per minute.

Geared 3 1/2 to 1.

Floor space, 6' x 2' 3".

Gross weight, 1,700 lbs.

Net weight, 1,500 lbs.

Boxed measurements, 69" by 33" by 48".

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

7 sets of cap dies, 3/4", 5/8", 3/2", 5/8", 3/4", 3/2",

1".

7 nut taps as per dies.

1 adjustable tap chuck and top die.

1 1/4" MACHINE.

Suitable for threading and tapping 3/8" to 1 1/4", either right or left hand. Cone, 8", 10", and 12" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute.

Geared 4 1/2 to 1.

Floor space, 6' by 2' 3".

Gross weight, 2,100 lbs.

Net weight, 1,650 lbs.

Boxed measurements, 77" by 35" by 50".

Regular equipment consists of: Pump, countershaft, wrenches and automatic die head; 8 sets of cap dies, 3/8", 1/2", 5/8", 3/4", 3/2",

1", 1 1/8", 1 1/4"; 8 nut taps as per dies; 1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.



FIG. 11693.

1" AND 1 1/4" SINGLE BOLT CUTTERS.

CLASS B.

DESCRIPTION FIG. 11694.

1" MACHINE.

Suitable for threading and tapping 1/4" to 1", either right or left hand. Cone, 8", 10", and 12" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 250 revolutions per minute.

Geared 4 1/2 to 1.

Floor space, 5' 3" by 2'.

Gross weight, 1,500 lbs.

Net weight, 1,300 lbs.

Boxed measurements, 66" by 33" by 48".

Regular equipment consists of:

Countershaft, wrenches, and automatic die head.

6 sets of cap dies, 3/4", 5/8", 3/2", 5/8", 3/4", 3/2", 1",

6 nut taps as per dies.

1 adjustable tap chuck and stop die.

1 1/4" MACHINE.

Suitable for threading and tapping 3/8" to 1 1/4", either right or left hand. Cone, 8", 10", and 12" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 4 1/2 to 1.

Floor space, 5' 6" by 2'.

Gross weight, 1,600 lbs.

Net weight, 1,350 lbs.

Boxed measurements, 75" by 35" by 50".

Regular equipment consists of: Countershaft and wrenches, 8 sets of cap dies, 3/8", 1/2", 5/8", 3/4", 3/2", 1", 1 1/8", 1 1/4"; 8 nut taps as per dies; 1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.

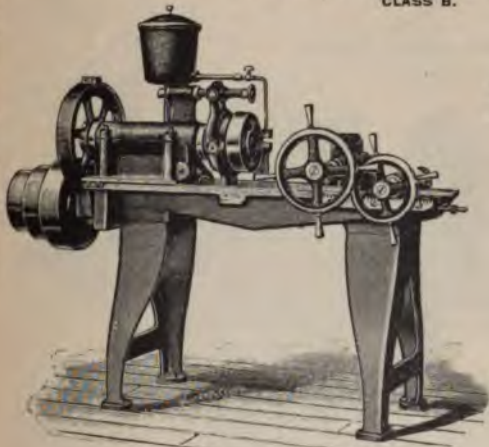


FIG. 11694.

BOLT CUTTING MACHINES.

NO. 3 HAND BOLT CUTTER AND NUT TAPPER.



FIG. 11695.

DESCRIPTION FIG. 11695.

Capacity, cuts $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1 ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", $1\frac{1}{2}$ ".
Weight, 500 lbs.

Machine is furnished with tap chuck wrenches and solid die holder, and may be supplied in three styles, as follows:

- A.—Without taps and dies.
- B.—With taps and solid dies, $\frac{3}{8}$ " to $1\frac{1}{2}$ ".
- C.—With taps and adjustable dies, $\frac{3}{8}$ " to $1\frac{1}{2}$ ".

Power machine.—This same machine can be furnished with cone pulley and countershaft for belt drive, if desired. Driving pulleys on countershaft, $10" \times 2\frac{3}{4}"$. Speed of countershaft, 100 revolutions per minute. In making inquiry, specify whether the hand or the power machine is wanted.

$1\frac{1}{2}$ " SINGLE BOLT CUTTER.

CLASS A.

DESCRIPTION FIG. 11696.

Suitable for threading and tapping $\frac{3}{8}$ " to $1\frac{1}{2}$ ", either right or left hand. Cone, 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with $16" \times 4"$ pulleys, 225 revolutions per minute. Geared $4\frac{1}{2}$ to 1.

Floor space, 6' by 2' 3".

Gross weight, 2,300 lbs.

Net weight, 1,750 lbs.

Boxed measurements, 80" by 35" by 50".

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

9 sets of cap dies, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", 1 ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", $1\frac{1}{2}$ ".

9 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: The equipment may be varied to suit individual requirements.

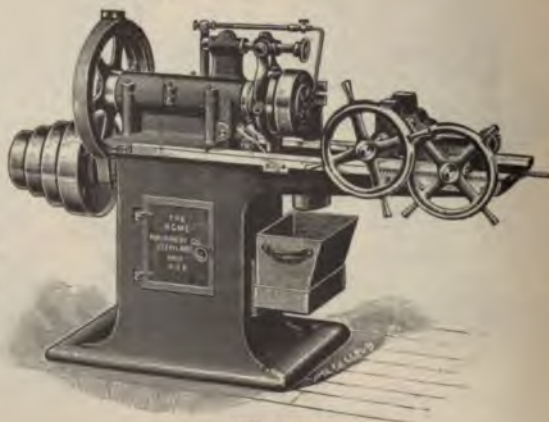


FIG. 11696.

BOLT CUTTING MACHINES.

**1½" SINGLE BOLT CUTTER.
CLASS B.**

DESCRIPTION FIG. 11697.

Suitable for threading and tapping ¾" to 1½", either right or left hand. Cone, 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 4½ to 1.

Floor space, 5' 9" by 2'.

Gross weight, 1,750 lbs.

Net weight, 1,500 lbs.

Boxed measurements, 78" by 35" by 50".

Regular equipment consists of:

Countershaft, wrenches and automatic die head.

9 sets of cap dies, ½", ¾", ¾", ¾", 1", 1¼", 1¼", 1½", 1½".

9 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.

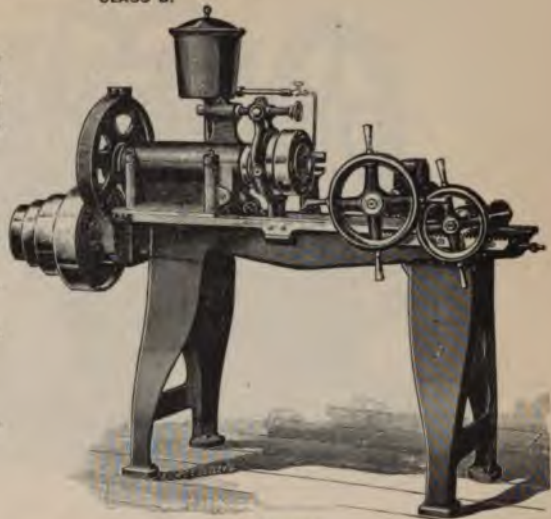


FIG. 11697.

**2" SINGLE BOLT CUTTER.
CLASS A.**

DESCRIPTION FIG. 11698.

Suitable for threading and tapping ¾" to 2", either right or left hand. Cone, 8", 10", 12", 14", and 16" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 6¼ to 1.

Floor space, 7' 3" by 2' 7".

Gross weight, 3,000 lbs.

Net weight, 2,400 lbs.

Boxed measurements, 96" by 39" by 50".

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

11 sets of cap dies, ¾", ¾", ¾", ¾", 1", 1¼", 1¼", 1½", 1½", 1½", 1½", 2".

11 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.



FIG. 11698.

BOLT CUTTING MACHINES.

NO. 3 HAND BOLT CUTTER AND NUT TAPPER.

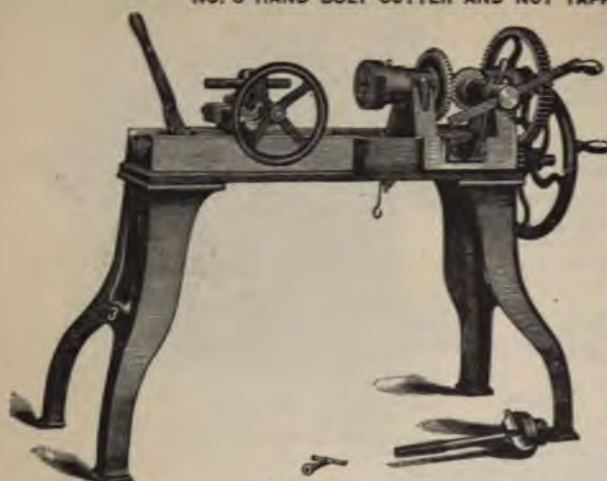


FIG. 11695.

DESCRIPTION FIG. 11695.

Capacity, cuts $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $1\frac{1}{4}$ ", $1\frac{3}{4}$ ", $1\frac{3}{4}$ ", $1\frac{3}{4}$ ".
Weight, 500 lbs.

Machine is furnished with tap chuck wrenches and solid die holder, and may be supplied in three styles, as follows:

- A.—Without taps and dies.
- B.—With taps and solid dies, $\frac{3}{4}$ " to $1\frac{1}{2}$ ".
- C.—With taps and adjustable dies, $\frac{3}{4}$ " to $1\frac{1}{2}$ ".

Power machine.—This same machine can be furnished with cone pulley and countershaft for belt drive, if desired. Driving pulleys on countershaft, $10" \times 2\frac{1}{2}"$. Speed of countershaft, 100 revolutions per minute. In making inquiry, specify whether the hand or the power machine is wanted.

$1\frac{1}{2}"$ SINGLE BOLT CUTTER.

CLASS A.

DESCRIPTION FIG. 11696.

Suitable for threading and tapping $\frac{1}{4}"$ to $1\frac{1}{2}"$, either right or left hand. Cone, 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with $10" \times 4"$ pulleys, 225 revolutions per minute. Geared $4\frac{1}{2}$ to 1.

Floor space, 6' by 2' 3".

Gross weight, 2,300 lbs.

Net weight, 1,750 lbs.

Boxed measurements, 80" by 35" by 50".

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

9 sets of cap dies, $\frac{1}{4}"$, $\frac{3}{8}"$, $\frac{1}{2}"$, $\frac{3}{4}"$,

$1"$, $1\frac{1}{4}"$, $1\frac{3}{4}"$, $1\frac{3}{4}"$, $1\frac{3}{4}"$.

9 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: The equipment may be varied to dual requirements.

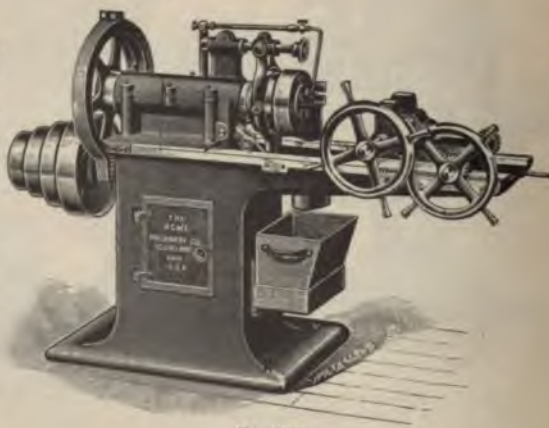


FIG. 11696.

BOLT CUTTING MACHINES.

**1½" SINGLE BOLT CUTTER.
CLASS B.**

DESCRIPTION FIG. 11697.

Suitable for threading and tapping ¾" to 1½", either right or left hand. Cone, 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 4½ to 1.

Floor space, 5' 9" by 2'.

Gross weight, 1,750 lbs.

Net weight, 1,500 lbs.

Boxed measurements, 78" by 35" by 50".

Regular equipment consists of:

Countershaft, wrenches and automatic die head.

9 sets of cap dies, ½", ¾", ¾", ¾", 1", 1½", 1½", 1½", 1½".

9 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.

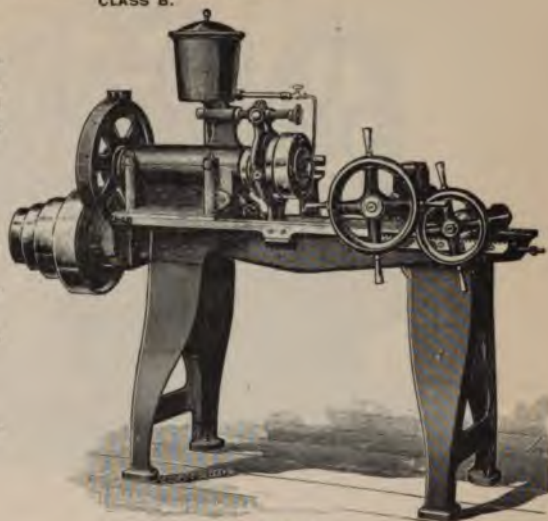


FIG. 11697.

**2" SINGLE BOLT CUTTER.
CLASS A.**

DESCRIPTION FIG. 11698.

Suitable for threading and tapping ¾" to 2", either right or left hand. Cone, 8", 10", 12", 14", and 16" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 6¼ to 1.

Floor space, 7' 3" by 2' 7".

Gross weight, 3,000 lbs.

Net weight, 2,400 lbs.

Boxed measurements, 96" by 39" by 56".

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

11 sets of cap dies, ½", ¾", ¾", ¾", ¾", 1", 1½", 1½", 1½", 1½", 1½", 2".

11 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.



FIG. 11698.

BOLT CUTTING MACHINES.

2 1/4" AND 2 1/2" SINGLE BOLT CUTTERS.

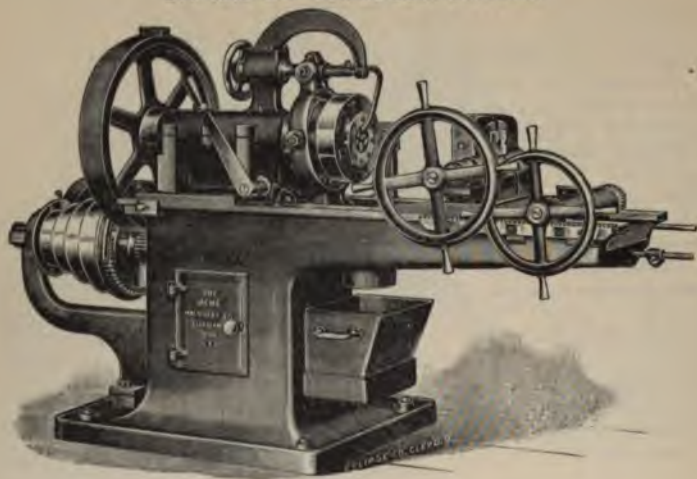


FIG. 11699.

DESCRIPTION FIG. 11699.

2 1/4" MACHINE.

Suitable for threading and tapping 1/2" to 2 1/4", either right or left hand. Cone 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with 10" x 4" pulleys, 225 revolutions per minute. Geared 27 1/4 to 1.

Floor space, 8' 2" by 3'.

Gross weight, 3,800 lbs.

Net weight, 3,100 lbs.

Boxed measurements, 100" by 40" by 58"

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

13 sets of cap dies, 3/8", 1/2", 3/4", 1", 1 1/4", 1 3/4", 1 1/2", 1 3/4", 1 3/4", 1 3/4", 2", 2 1/4".

12 nut taps as per dies.

1 adjustable tap chuck and stop die.

2 1/2" MACHINE.

Suitable for threading and tapping 1/2" to 2 1/2", either right or left hand. Cone, 8", 10", 12", and 14" in diameter for 3" belt. Speed of countershaft with 10" x 4" pulleys, 225 revolutions per minute. Geared 27 1/4 to 1.

Floor space, 8' 4" by 3'.

Gross weight, 4,000 lbs.

Net weight, 3,300 lbs.

Boxed measurements, 100" by 40" by 58"

Regular equipment consists of:

Pump, countershaft, wrenches and automatic die head.

13 sets of cap dies, 3/8", 1/2", 3/4", 1", 1 1/4", 1 3/4", 1 1/2", 1 3/4", 1 3/4", 1 3/4", 2", 2 1/4", 2 1/2".

13 nut taps as per dies.

1 adjustable tap chuck and stop die.

Note: Equipment may be varied to suit individual requirements.

BOLT CUTTING MACHINES.

3", 3½", 4" AND 5" SINGLE BOLT CUTTERS.

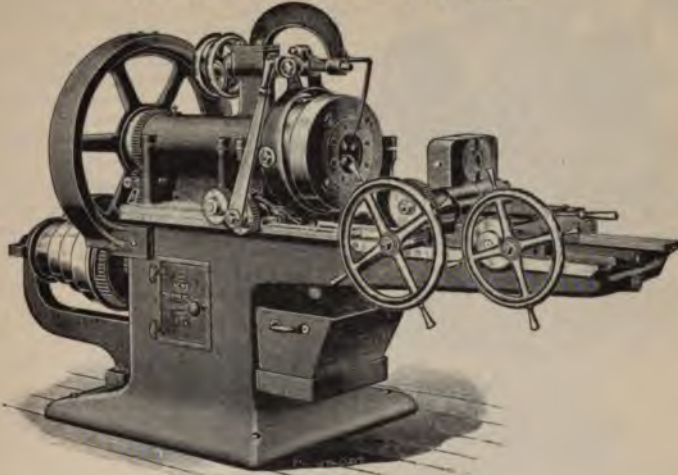


FIG. 11700.

DESCRIPTION FIG. 11700.

Each machine is furnished with pump, countershaft, wrenches and automatic die head, also adjustable tap chuck and stop die. The regular assortments of taps and dies can be varied to suit requirements. The following assortments will be supplied unless otherwise specified:

- 3" Machine.—13 sets of cap dies, 1", 1½", 1¾", 1¾", 1½", 1¾", 1¾", 1¾", 2", 2¼", 2½", 2½", 3".
13 nut taps as per dies.
- 3½" Machine.—15 sets of cap dies, 1", 1½", 1¾", 1¾", 1½", 1¾", 1¾", 1¾", 1¾", 2", 2¼", 2½", 2½", 3", 3¼", 3½".
15 nut taps as per dies.
- 4" Machine.—13 sets of cap dies, 1½", 1¾", 1¾", 1¾", 2", 2¼", 2½", 2½", 3", 3¼", 3½", 3½", 4".
13 nut taps as per dies.
- 5" Machine.—15 sets of cap dies, 1½", 1¾", 1¾", 1¾", 2", 2¼", 2½", 2½", 3", 3¼", 3½", 3½", 4", 4½", 5".
No taps.

SPECIFICATIONS.

Size of Machine.....	3"	3½"	4"	5"
Capacity*.....	½" to 3"	½" to 3½"	1" to 4"	1" to 5"
Number of steps on cone pulley.....	4	4	4	4
Width of belt on cone pulley.....	3"	3"	4"	4"
Countershaft pulleys.....	16" x 4"	16" x 4"	10" x 4"	16" x 4"
Speed of countershaft, revolutions per minute.....	225	225	200	200
Ratio of gearing.....	27¼ to 1	27¼ to 1	27¼ to 1	27¼ to 1
Net weight.....	3,500 lbs.	3,800 lbs.	4,400 lbs.	4,800 lbs.
Floor space occupied.....	8' 4" x 3'	8' 4" x 3'	9' 7" x 3'	9' 7" x 3'

*Machines will cut either right or left hand, but it is understood that dies for right hand threads will be supplied unless otherwise specified.

8" SINGLE BOLT CUTTER.

BOLT CUTTING MACHINES.

DESCRIPTION FIG. 11701.

Machine is furnished with pump, countershaft, wrenches and seventeen sets of cap dies for 2", 2 1/4", 2 1/2", 2 3/4", 3", 3 1/4", 3 1/2", 3 3/4", 4", 4 1/4", 4 1/2", 4 3/4", 5", 5 1/4", 5 1/2", 5 3/4", 6" diameters, also adjustable tap chuck and stop die for taps up to 4" diameter, but no taps. Countershaft has pulleys 16" x 4" and should run 200 revolutions per minute.

Net weight, 6,600 lbs.
Floor space, 11' 2" x 3' 2".

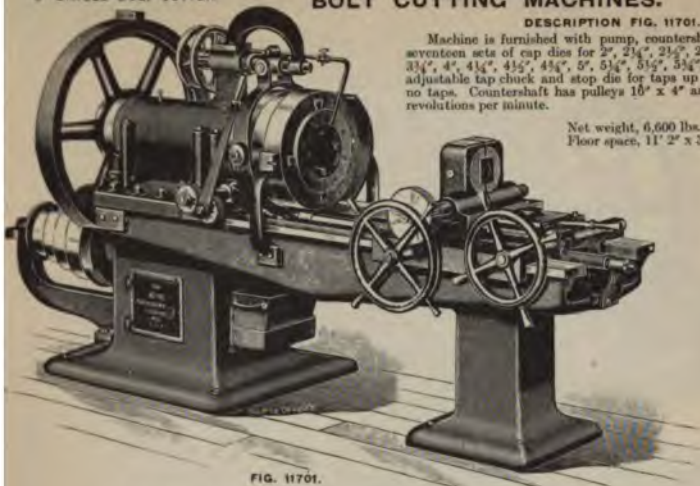


FIG. 11701.

DESCRIPTION FIG. 11702.

Designed especially for threading work from 1/4" to 1/2" inclusive, either right or left hand. Cone, 5 1/4", 7 1/4", and 9 1/4" in diameter for 2 1/2" dia. Speed of countershaft with 16" x 4" pulleys, 200 revolutions per minute.

Machine is furnished with pump, countershaft, wrenches, and automatic, and ten sets of cap dies, two sets each, 1/4", 3/8", 5/8", 3/4", 1/2".
Floor space, 3' 8" by 2' 2".
Gross weight, 1,800 lbs.
Net weight, 1,400 lbs.
Boxed measurements, 56" by 34" by 46".

1-1/2" DOUBLE BOLT CUTTER.



FIG. 11702.

1", 1 1/4" AND 1 1/2" DOUBLE BOLT CUTTERS.

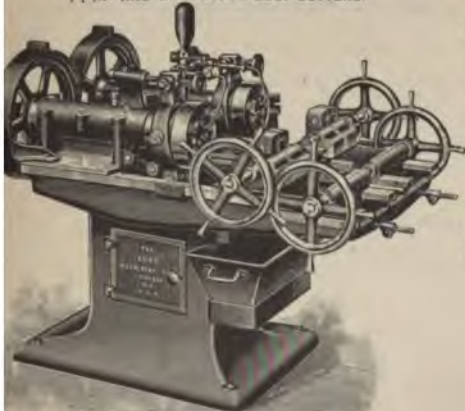


FIG. 11703.

DESCRIPTION FIG. 11703.

Each machine is supplied with pump, countershaft, wrenches and automatic, also adjustable tap chuck and stop die. Countershaft has pulleys 16" diameter

THE FAIRBANKS COMPANY

BOLT CUTTING MACHINES.

DESCRIPTION FIG. 11703.—Continued.

by 4" face and should run 225 revolutions per minute. The following assortments of dies and taps will be supplied unless otherwise specified.

1" Machine.—Twelve sets of cap dies, two sets each, $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ "; one set each $\frac{7}{8}$ ", 1".
7 nut taps as per dies.

1 $\frac{1}{4}$ " Machine.—Thirteen sets of cap dies, two sets each $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ "; one set each 1", 1 $\frac{1}{4}$ ", 1 $\frac{1}{4}$ ".
8 nut taps as per dies.

1 $\frac{1}{2}$ " Machine.—Fourteen sets of cap dies, two sets each $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", 1"; one set each 1 $\frac{1}{2}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{1}{2}$ ".
9 nut taps as per dies.

1" machine weighs 2,300 lbs.
1 $\frac{1}{4}$ " machine weighs 2,500 lbs.
1 $\frac{1}{2}$ " machine weighs 2,700 lbs.

2" DOUBLE BOLT CUTTER.



FIG. 11704.

DESCRIPTION FIG. 11704.

Each machine is furnished with pump, countershaft, wrenches, automatic, adjustable tap chuck and stop die. Countershaft has pulleys 16" diameter by 4" face and should run 225 revolutions per minute.

2" machine weighs 4,200 lbs.
2 $\frac{1}{2}$ " machine weighs 5,800 lbs.

The following assortments of dies and taps will be furnished unless otherwise specified:

2" Machine.—Twenty sets of cap dies, two sets each $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", 1", 1 $\frac{1}{2}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ "; one set each 1 $\frac{1}{4}$ ", 2".
11 nut taps as per dies.

2 $\frac{1}{2}$ " Machine.—Twenty-four sets of cap dies, two sets each $\frac{3}{4}$ ", $\frac{3}{8}$ ", 1", 1 $\frac{1}{2}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{4}$ ", 2"; and one set each 2 $\frac{1}{4}$ ", 2 $\frac{1}{2}$ ".
13 nut taps as per dies.

BOLT CUTTING MACHINES.

1" AND 1 1/2" TRIPLE BOLT CUTTERS.

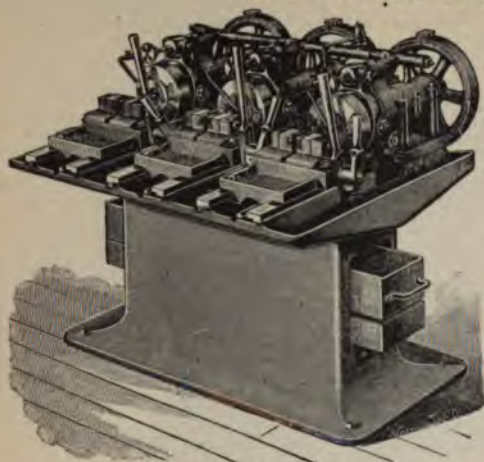


FIG. 11705.

DESCRIPTION FIG. 11705.

These machines are designed especially for manufacturing purposes, to produce as large a quantity of work as is possible for a single operator to handle and still run the machine at a rate of speed that will insure long life to the machine and dies and produce perfect work.

Each machine is furnished with pump, countershaft and automatic.

The following assortments of dies will be supplied unless otherwise specified.

1" Machine.—Six sets of cap dies, one set each 3/8", 1/2", 5/8", 3/4", 7/8", 1".

1 1/2" Machine.—Nine sets of cap dies, one set each 1/2", 5/8", 3/4", 7/8", 1", 1 1/8", 1 1/4", 1 3/8", 1 1/2".

SPECIFICATIONS.

	1"	1 1/2"
Countershaft pulleys	16" x 4"	16" x 4"
Speed of countershaft	175	160
Net weight	3,000 lbs.	3,800 lbs.
Floor space	4' 6" x 4' 2"	5' 2" x 4' 10"

2" TRIPLE BOLT CUTTER.

DESCRIPTION FIG. 11706.

This machine is designed especially for manufacturing purposes, to produce as large a quantity of work as is possible for a single operator to handle and still run the machine at a rate of speed that will insure long life to the machine and dies and produce perfect work. Cone, 8", 10", 12", 14", 16" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 160 revolutions per minute.

Each machine is furnished with pump, countershaft, wrenches, automatic, and eleven sets of cap dies, one set each 1 1/2", 5/8", 3/4", 7/8", 1", 1 1/8", 1 1/4", 1 3/8", 1 1/2", 1 3/4", 1 3/8", 2".

Floor space, 6' 5" x 5'.
Gross weight, 5,500 lbs.
Net weight, 4,800 lbs.
Boxed measurements, 66" x 66" x 60".

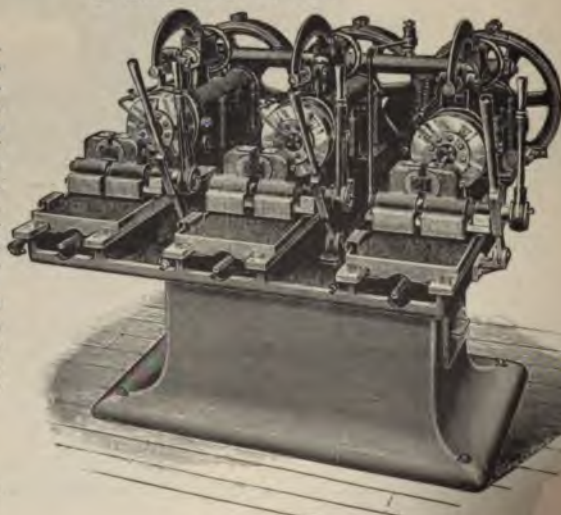


FIG. 11706.

BOLT CUTTING MACHINES.

1 1/2" SINGLE STAY BOLT CUTTER.

DESCRIPTION FIG. 11707.

This machine was designed for locomotive and marine boiler shops. When equipped with lead screw attachment*, will thread a stay bolt 36" long of absolutely correct pitch. It is suitable for threading and tapping 3/4" to 1 1/4", either right or left hand. Cone 8", 10", 12" and 14" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 4 1/2 to 1. Will cut 36" in length without re-gripping.

Each machine is furnished with pump, countershaft, wrenches, automatic and 9 sets of cap dies, 3/2", 5/8", 3/4", 3/8", 1", 1 1/8", 1 1/4", 1 3/8", 1 1/2"; also 9 nut taps as per dies, adjustable tap chuck and stop die. Net weight, 2,000 lbs.

* For description of lead screw attachment, see page 362

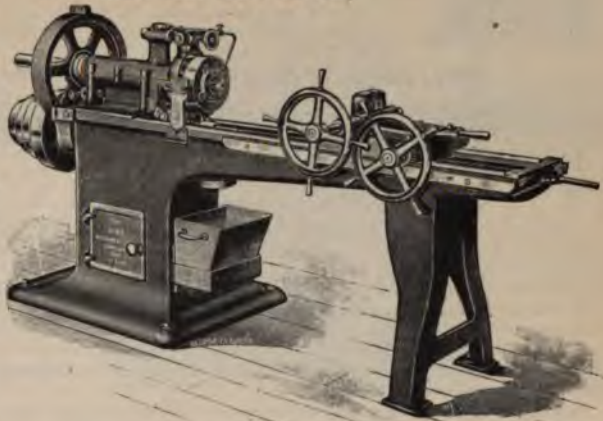


FIG. 11707.

1 1/2" DOUBLE STAY BOLT CUTTER.

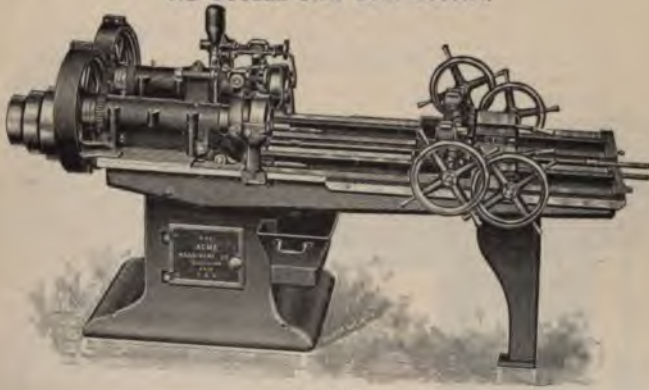


FIG. 11708.

DESCRIPTION FIG. 11708.

This machine was designed for locomotive and marine boiler shops. When equipped with lead screw attachment†, will thread at one time two stay bolts 36" long of absolutely correct pitch. It is suitable for threading and tapping 3/4" to 1 1/2", either right or left hand. Cone, 8", 10", 12" and 14" in diameter for 3" belt. Speed of countershaft with 16" x 4" pulleys, 225 revolutions per minute. Geared 4 1/2 to 1. Will cut 36" in length without re-gripping.

† This machine is regularly furnished with pump, countershaft, wrenches and automatic, also 14 sets of cap dies, two sets each, 1", one set each 1 1/8", 1 1/4", 1 3/8", 1 1/2"; 9 nut taps as per dies, adjustable tap chuck and stop die.

lbs.

† For description of lead screw attachment, see page 362.



BOLT CUTTING MACHINES.

LEAD SCREW AND BRONZE NUTS.

Can be applied to all Acme bolt cutters, described on preceding pages, during course of construction only.

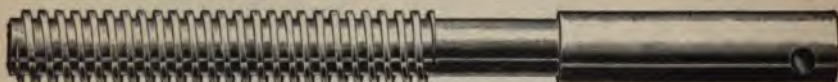


FIG. 11709.

DESCRIPTION FIG. 11709.

The lead screw of a bolt cutter and that of a lathe differ very materially with regard to their natural wear. The bolt cutter produces a full thread usually with one cut, and in so doing strains the lead screw much more than the lathe would do by producing the same thread in several cuts. This is owing to the difference of pressure upon the screw when cutting threads, and if a long train of gears are used to drive the lead screw, there will necessarily be too much lost motion to produce threads of a perfect pitch.

Our power feed attachment can be applied to Acme bolt cutters of all sizes during the course of construction, but not after the machines are in operation, as a special head stock and carriage are required in order to use the lead screw. The object of using this device is to produce coarse bastard threads true to pitch, and also to act as a feed when milling round work. In cutting ordinary threads, such as United States and Whitworth standards, this attachment is not necessary on the Acme bolt cutters. We especially recommend this attachment for stay bolt work.

The spindle to which the lead screw is attached is driven directly from the main spindle with two spur gears, thus reducing the lost motion between the dies and the lead screw to the smallest possible amount. The lead screws are made short, and they can be changed from one pitch to another in less than three minutes. The carriage is supplied with a bronze split nut opened and closed by hand, by means of a cam disk and lever conveniently arranged.

BOLT POINTING MACHINES.

1-2" POINTING MACHINE.

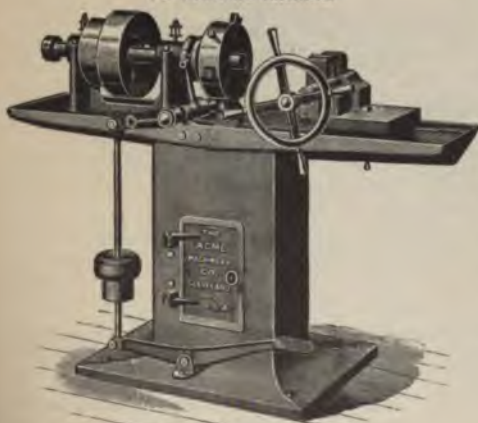


FIG. 11710.

DESCRIPTION FIG. 11710.

Suitable for shaping and finishing the points of bolts and studs $\frac{1}{4}$ " to $\frac{1}{2}$ ". Cone, 8° and 10° in diameter for 4" bolt. Speed of countershaft with 16" x 4" pulleys, 200 revolutions per minute.

This machine is supplied with a plunger pump bolted to a bracket in the column. The discharge pipe passes through the hollow steel spindle and conveys the lubricant directly upon the cutter. The carriage is stationary, and has steel lined vise jaws to grip rods and headless work of any length. The vise jaws are arranged also to receive holders for square, hexagon, and other shape bolt heads. The pointing head is moved forward by means of a foot trestle and returned by the counterweight. The cutting tool is made of square bar steel, shaped to any form of point desired. It can be removed, ground and replaced in a few minutes.

Each machine is furnished with countershaft, wrenches, and five sets of cutting tools, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $1\frac{1}{2}$ ".

Floor space, 4' 9" by 2'.

Gross weight, 1,200 lbs.

Net weight, 900 lbs.

Boxed measurements, 80" by 26" by 46".

BOLT POINTING MACHINES.

DESCRIPTION FIG. 1171.

Suitable for shaping and finishing the points of bolts and studs $\frac{3}{8}$ " to 1". Cuts, 8" and 10" in diameter for 4" belt. Speed of countershaft with 16" x 4" pulleys, 125 revolutions per minute.

This machine is supplied with a plunger pump bolted to a bracket in the column. The discharge pipe passes through the hollow steel spindle and conveys the lubricant directly upon the cutter. The carriage has steel lined vice jaws to grip rods and headless work of any length; they are arranged also to receive holders for square, hexagon and other shape bolt heads. When pointing small diameters the pointing head is moved forward by means of the foot treadle and when pointing $\frac{3}{4}$ " diameter and above, the geared carriage is used to force the work against the cutter. This is much more rapid than the treadle on large work. The cutting tool is made of square bar steel, shaped to any form of point desired. It can be removed, ground and replaced in a few minutes.

Each machine is furnished with countershaft, wrenches, and 6 sets of cutting tools, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1".

Floor space, 5' 2" by 2'.

Gross weight, 1,700 lbs.

Net weight, 1,300 lbs.

Boxed measurements, 64" by 28" by 50".

1" POINTING MACHINE.



FIG. 1171.

1 1/2" AND 2" POINTING MACHINES.



FIG. 1172.

DESCRIPTION FIG. 1172.

These machines are supplied with a plunger pump bolted to a bracket in the column. The discharge pipe passes through the hollow spindle and conveys the lubricant directly upon the cutter. The carriage has steel lined vice jaws to grip rods and headless work of any length; they are arranged also to receive holders for square, hexagon and other shape bolt heads. The cutting tool is made of square bar steel, shaped to any form of point desired. It can be removed, ground and replaced in a few minutes.

The $1\frac{1}{2}$ " machine is suitable for shaping and finishing points of bolts and studs from $\frac{1}{2}$ " to $1\frac{1}{2}$ ", and is regularly supplied with countershaft, wrenches, and 9 sets of cutting tools, $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", and $1\frac{1}{2}$ ".

The 2" machine is suitable for shaping and finishing points of bolts and studs from $\frac{1}{2}$ " to 2", and is regularly furnished with 11 sets of cutting tools, $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", and 2".

.....	11"	2"
.....	16" x 4"	16" x 4"
.....	250	225
.....	6' x 2'	3'6" x 2' 2"
.....	1,700 lbs.	2,000 lbs.
.....	1,100 lbs.	2,600 lbs.

NUT TAPPING MACHINES.

1-2" FOUR SPINDLE NUT TAPPER.

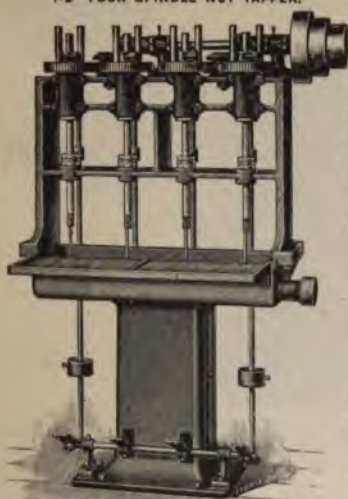


FIG. 11713.

Each machine is furnished with pump, countershaft, wrenches, chip pans, 6 quick acting spring sockets and 6 tapper taps, one each, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", and 1"

Countershaft has pulleys 16" x 4" and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:
 First pair of spindles..... $4\frac{3}{4}$ to 1
 Second pair of spindles..... $3\frac{1}{4}$ to 1
 Floor space, 4' 11" by 3' 5".
 Gross weight, 3,500 lbs.
 Net weight, 3,000 lbs.
 Boxed measurements, 64" by 46" by 70".

SIX SPINDLE MACHINE.

Geared:
 First pair of spindles..... $4\frac{3}{4}$ to 1
 Second pair of spindles..... $3\frac{1}{4}$ to 1
 Third pair of spindles..... $2\frac{1}{4}$ to 1
 Floor space, 6' 6" by 3' 5".
 Gross weight, 4,500 lbs.
 Net weight, 3,800 lbs.
 Boxed measurements, 90" by 46" by 82"

DESCRIPTION FIG. 11713.

Suitable for tapping $\frac{1}{2}$ " to $\frac{1}{2}$ ", either square or hexagon nuts. Cone, 8", 10", and 12" in diameter for 2" belt. Speed of countershaft with 16" x 4" pulleys, 280 revolutions per minute.

The four spindles on this machine are driven by gearing like our ordinary tappers, except that each alternate gear is of compressed raw hide, so that when the machine is run at a high rate of speed it is comparatively noiseless. The connection between the tap spindle and gear sleeve is made by a simple positive clutch. Each spindle may be stopped at the will of the operator.

Machine is furnished with countershaft, wrenches and 4 taper taps, one each, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and $\frac{1}{2}$ ".

Floor space, 3' 2" by 3' 1".

Gross weight, 1,600 lbs.

Net weight, 1,200 lbs.

Boxed measurements, 79" by 54" by 29".

DESCRIPTION FIG. 11714.

These machines have adjustable nut holders and quick acting sockets. Taps can be removed and replaced while the machine runs at full speed or each spindle may be stopped at will. The spindles are counterbalanced to prevent the breaking of taps, which are sometimes broken by heavy spindles. Each pair of spindles run at different speeds, but can be arranged to run at one speed if desired.

1" FOUR AND SIX SPINDLE NUT TAPPER.

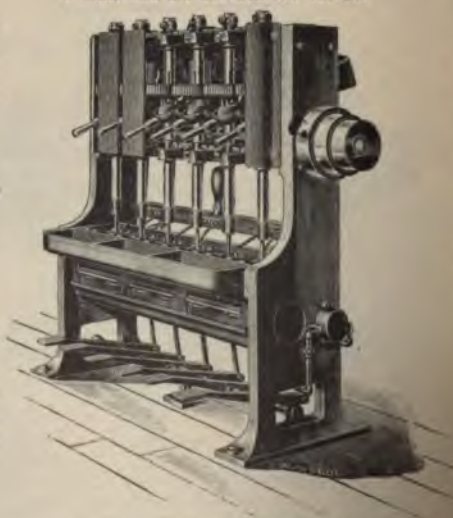


FIG. 11714. SHOWS SIX SPINDLE MACHINE.

NUT TAPPING MACHINES.

DESCRIPTION FIG. 11715.

These machines have adjustable nut holders and quick acting sockets. Taps can be removed and replaced while the machine runs at full speed or each spindle may be stopped at will. The spindles are counterbalanced to prevent the breaking of taps, which are sometimes broken by heavy spindles. Each pair of spindles run at different speeds, but can be arranged to run at one speed if desired.

Each machine is furnished with pump, countershaft, wrenches, chip pans, 9 quick acting spring sockets and 9 taper taps, one each, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{3}{8}$ ", and $1\frac{1}{2}$ ". Countershaft has pulleys $16" \times 4"$ and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:
 First pair of spindles..... $5\frac{1}{2}$ to 1
 Second pair of spindles..... $4\frac{1}{4}$ to 1
 Floor space, 6' by 3' 7".
 Gross weight, 5,300 lbs.
 Net weight, 4,400 lbs.
 Boxed measurements, 91" by 50" by 79".

SIX SPINDLE MACHINE.

Geared:
 First pair of spindles..... $5\frac{1}{2}$ to 1
 Second pair of spindles..... $4\frac{1}{4}$ to 1
 Third pair of spindles..... $3\frac{1}{2}$ to 1
 Floor space, 8' 2" by 3' 7".
 Gross weight, 6,800 lbs.
 Net weight, 6,000 lbs.
 Boxed measurements, 104" by 48" by 83".

2" FOUR AND SIX SPINDLE BACK GEARED NUT TAPPERS.

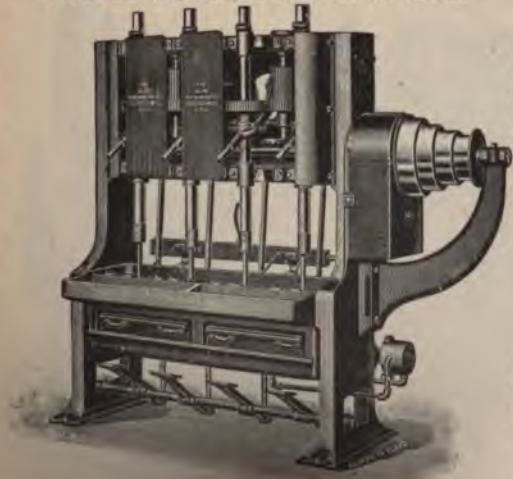


FIG. 11718. SHOWS FOUR SPINDLE MACHINE.

1 1/2" FOUR AND SIX SPINDLE NUT TAPPERS.

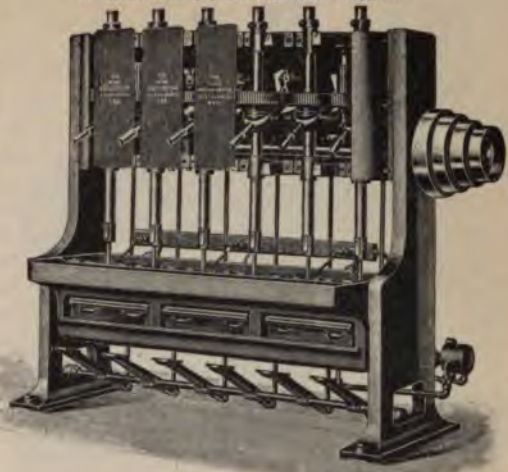


FIG. 11715. SHOWS SIX SPINDLE MACHINE.

DESCRIPTION FIG. 11716.

Similar to $1\frac{1}{2}$ " machines, but strongly back geared. Each machine is furnished with pump, countershaft, wrenches, chip pans, 11 quick acting spring sockets and 11 taper taps, one each, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{3}{8}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", 2". Countershaft has pulleys $16" \times 4"$ and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:
 First pair of spindles..... $22\frac{1}{2}$ to 1
 Second pair of spindles..... $17\frac{1}{4}$ to 1
 Floor space, 7' 2" by 3' 7".
 Gross weight, 5,800 lbs.
 Net weight, 5,000 lbs.
 Boxed measurements, 92" by 50" by 89".

SIX SPINDLE MACHINE.

Geared:
 First pair of spindles..... $22\frac{1}{2}$ to 1
 Second pair of spindles..... $17\frac{1}{4}$ to 1
 Third pair of spindles..... $13\frac{3}{4}$ to 1
 Floor space, 9' 10" by 3' 7".
 Gross weight, 7,300 lbs.
 Net weight, 6,500 lbs.
 Boxed measurements, 123" by 48" by 89".

NUT TAPPING MACHINES.

1-2" FOUR SPINDLE NUT TAPPER.

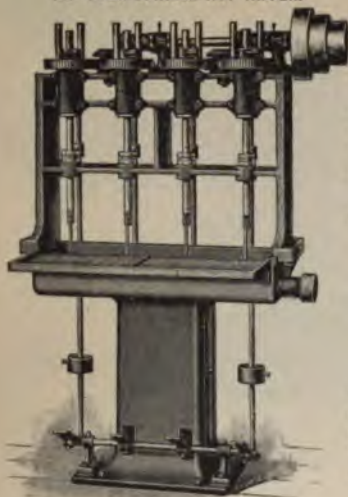


FIG. 11713.

Each machine is furnished with pump, countershaft, wrenches, chip pans, 6 quick acting spring sockets and 6 tapper taps, one each, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", and 1"

Countershaft has pulleys 16" x 4" and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:

First pair of spindles.....	43 $\frac{1}{4}$ to 1
Second pair of spindles.....	31 $\frac{1}{4}$ to 1
Floor space, 4' 11" by 3' 5".	
Gross weight, 3,500 lbs.	
Net weight, 3,000 lbs.	
Boxed measurements, 64" by 46" by 70".	

SIX SPINDLE MACHINE.

Geared:

First pair of spindles.....	43 $\frac{1}{4}$ to 1
Second pair of spindles.....	31 $\frac{1}{4}$ to 1
Third pair of spindles.....	21 $\frac{1}{4}$ to 1
Floor space, 6' 6" by 3' 5".	
Gross weight, 4,500 lbs.	
Net weight, 3,800 lbs.	
Boxed measurements, 90" by 46" by 82".	

DESCRIPTION FIG. 11713.

Suitable for tapping $\frac{3}{8}$ " to $\frac{1}{2}$ ", either square or hexagon nuts. Cone, 8", 10", and 12" in diameter for 2" belt. Speed of countershaft with 16" x 4" pulleys, 280 revolutions per minute.

The four spindles on this machine are driven by gearing like our ordinary tappers, except that each alternate gear is of compressed raw hide, so that when the machine is run at a high rate of speed it is comparatively noiseless. The connection between the tap spindle and gear sleeve is made by a simple positive clutch. Each spindle may be stopped at the will of the operator.

Machine is furnished with countershaft, wrenches and 4 tapper taps, one each, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", and $\frac{3}{4}$ ".

Floor space, 3' 2" by 3' 1".

Gross weight, 1,600 lbs.

Net weight, 1,200 lbs.

Boxed measurements, 79" by 54" by 29".

DESCRIPTION FIG. 11714.

These machines have adjustable nut holders and quick acting sockets. Taps can be removed and replaced while the machine runs at full speed or each spindle may be stopped at will. The spindles are counterbalanced to prevent the breaking of taps, which are sometimes broken by heavy spindles. Each pair of spindles run at different speeds, but can be arranged to run at one speed if desired.

1" FOUR AND SIX SPINDLE NUT TAPPER.

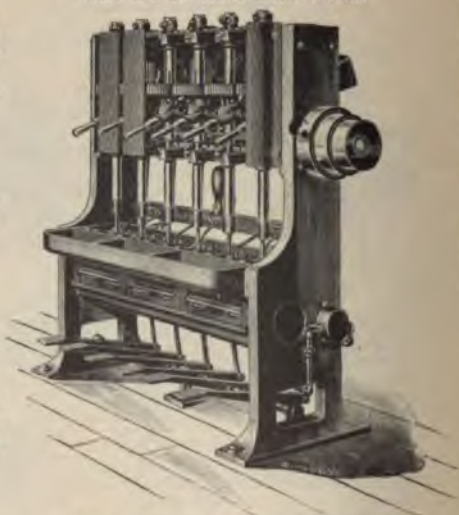


FIG. 11714. SHOWS SIX SPINDLE MACHINE.

NUT TAPPING MACHINES.

DESCRIPTION FIG. 11715.

These machines have adjustable nut holders and quick acting sockets. Taps can be removed and replaced while the machine runs at full speed or each spindle may be stopped at will. The spindles are counterbalanced to prevent the breaking of taps, which are sometimes broken by heavy spindles. Each pair of spindles run at different speeds, but can be arranged to run at one speed if desired.

Each machine is furnished with pump, countershaft, wrenches, chip pans, 9 quick acting spring sockets and 9 taper taps, one each, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", 1 $\frac{1}{8}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{3}{8}$ ", and 1 $\frac{1}{2}$ ". Countershaft has pulleys 16" x 4" and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:
 First pair of spindles..... 5 $\frac{1}{2}$ to 1
 Second pair of spindles..... 4 $\frac{1}{4}$ to 1
 Floor space, 6' by 3' 7".
 Gross weight, 5,300 lbs.
 Net weight, 4,400 lbs.
 Boxed measurements, 91" by 50" by 70".

SIX SPINDLE MACHINE.

Geared:
 First pair of spindles..... 5 $\frac{1}{2}$ to 1
 Second pair of spindles..... 4 $\frac{1}{4}$ to 1
 Third pair of spindles..... 3 $\frac{1}{2}$ to 1
 Floor space, 8' 2" by 3' 7".
 Gross weight, 6,800 lbs.
 Net weight, 6,000 lbs.
 Boxed measurements, 104" by 48" by 83".

1 $\frac{1}{2}$ " FOUR AND SIX SPINDLE NUT TAPPERS.

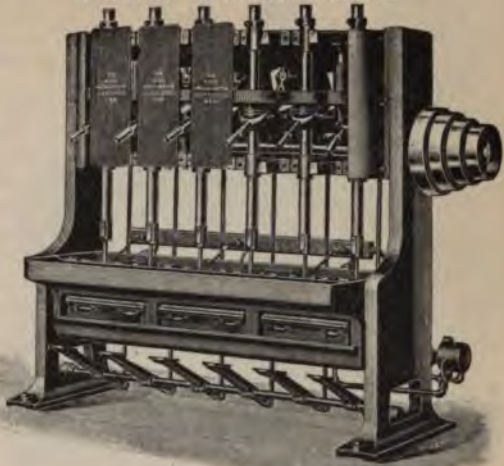


FIG. 11715. SHOWS SIX SPINDLE MACHINE.

2" FOUR AND SIX SPINDLE BACK GEARED NUT TAPPERS.

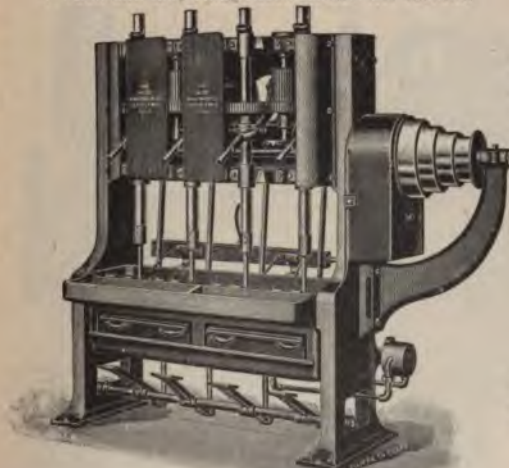


FIG. 11716. SHOWS FOUR SPINDLE MACHINE.

DESCRIPTION FIG. 11716.

Similar to 1 $\frac{1}{2}$ " machines, but strongly back geared. Each machine is furnished with pump, countershaft, wrenches, chip pans, 11 quick acting spring sockets and 11 taper taps, one each, $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", 1 $\frac{1}{8}$ ", 1 $\frac{1}{4}$ ", 1 $\frac{3}{8}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{3}{4}$ ", 2". Countershaft has pulleys 16" x 4" and should run 300 revolutions per minute.

FOUR SPINDLE MACHINE.

Geared:
 First pair of spindles..... 22 $\frac{1}{2}$ to 1
 Second pair of spindles..... 17 $\frac{1}{4}$ to 1
 Floor space, 7' 2" by 3' 7".
 Gross weight, 5,800 lbs.
 Net weight, 5,000 lbs.
 Boxed measurements, 92" by 50" by 80".

SIX SPINDLE MACHINE.

Geared:
 First pair of spindles..... 22 $\frac{1}{2}$ to 1
 Second pair of spindles..... 17 $\frac{1}{4}$ to 1
 Third pair of spindles..... 13 $\frac{3}{4}$ to 1
 Floor space, 9' 10" by 3' 7".
 Gross weight, 7,300 lbs.
 Net weight, 6,500 lbs.
 Boxed measurements, 123" by 48" by 80".

NUT FINISHING MACHINES.

NUT FACING MACHINE.



FIG. 11717.

The double headed nut milling machine has two independent head-stocks, each provided with an improved adjustable cutter, the teeth of which are made of $\frac{1}{2}$ " square steel, and are 4" in length. A set of nut arbors from $\frac{3}{8}$ " to $1\frac{1}{8}$ " are furnished with machine. There is also a device provided for setting the nuts in position on the arbors, so that they will come exactly square with the face of the cutter when they are placed for milling, and no further setting is required. The machine mills two sides of from twelve to twenty nuts at once, depending on the thickness of the nuts.

Machines will be sold separately if so desired.

DESCRIPTION FIGS. 11717 AND 11718.

When used in conjunction, these two machines make a very efficient plant for finishing nuts. The nut facing machine has many advantages over a lathe or ordinary facing machine. The tools for facing can be made 12" long, the profiles desired are planed or milled in lengthwise on the faces of them, and tool is ground on the end and always retains its shape; the tools are tempered the whole length, and no dressing is required. A pair of sample tools is furnished with each machine, and arbors from $\frac{3}{8}$ " to $1\frac{1}{8}$ " are furnished with the machine.

An important feature of this tool is a device for reaming the burr from the thread. A small tool is held in the carriage and operates on the nut the same time it is being faced, requiring only one operation to face the nut and ream the burr from the thread.

DOUBLE-HEADED NUT MILLING MACHINE.



FIG. 11718.

BOLT HEADING, UPSETTING AND FORGING MACHINES.

DESCRIPTION FIGS. 11719 TO 11723.

The bed is made in the box form with three deep longitudinal trusses, strengthened by a transverse truss through the box, which distribution of metal gives great strength to the bed, and the bearing next to the fly wheel is further strengthened with a steel tie-beam.

The shaft is of the best forged iron, or of fluid compressed steel, made with a clutch hub and two double disk cranks from one solid forging, and is carried in three large bearings. The face of the bearings being inclined toward the front of the machine at an angle of 45 degrees brings the thrust of the forging tools against solid metal and relieves the main caps and cap bolts from all strain.

The clutch hub has a mortise in which is fitted a tool steel pin. This pin engages with the clutch by placing the foot on the treadle and is automatically disengaged when the foot is removed, so that when making special forgings one or more blows can be given as may be required to finish the work, or the machine may be run continuously by throwing in the treadle latch.

The fly wheel is bushed with bronze, which insures smooth running, good wear and quick repair.

3-4" STEEL HEADING AND FORGING MACHINE.

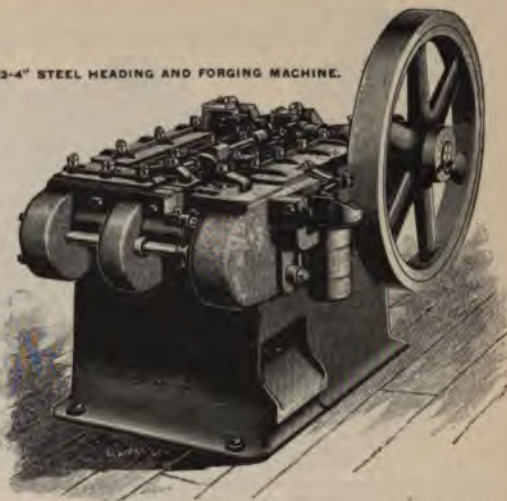


FIG. 11719.

1 1/2" HEADING AND FORGING MACHINE.

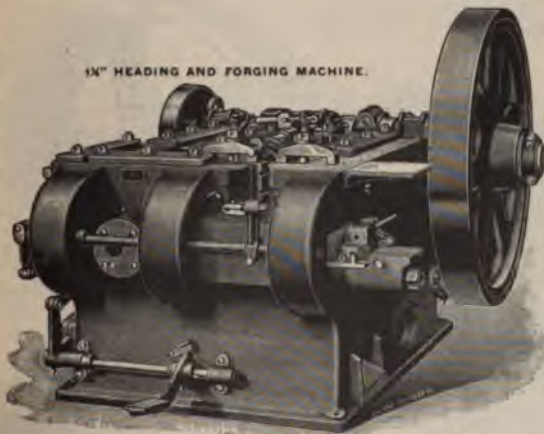


FIG. 11720.

The slides are provided with phosphor bronze ways and cast iron side gibs and run on hardened tool steel ways in the bed, to insure perfect alignment during years of service, and should the ways and gibs ever become worn they can be replaced in a short time without the trouble and expense of dismantling and removing the entire machine to the machine shop.

Stationary die block, movable die block and toggle block and slide are steel castings. The toggles are hardened tool steel forgings, running in bronze bushings. All of these parts have ample bearings and rest on steel ways in the same manner as the main slides, so that none of the reciprocating parts wear on the bed.

The dies and plungers are of novel construction and will turn out perfect work with few blows or strokes, so that square and hexagon head bolts are made in from two to three strokes, standard upsets at a single stroke and rivets at a single stroke right off the rod.

The production, as will be seen, is limited only by the activity of the operator and the capacity of the furnace used. The latter plays a very important part and should be constructed from the most approved plans.

BOLT HEADING, UPSETTING AND FORGING MACHINES.

2" HEADING AND FORGING MACHINE.

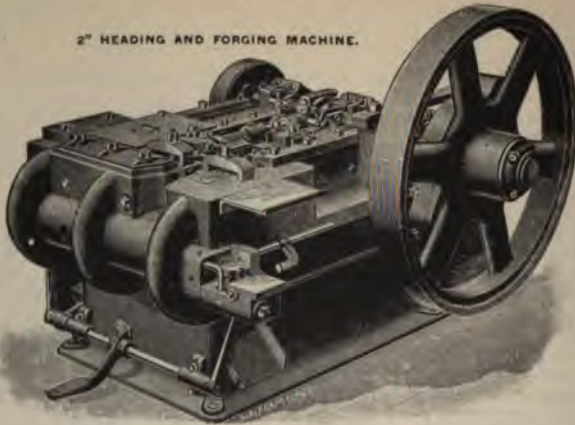


FIG. 11721.

DESCRIPTION FIGS. 11719 TO 11723.—Continued.

The stock gauge is also a new and valuable feature, remaining in front of the dies until they are entirely closed and then moving out of the line of the heading tools with a smooth and easy motion.

An effective outside shear is provided on all machines except the 3" and 4"

The latest improvement in these machines is what we call an "automatic relief and adjustable time device." This consists of a spring in the slide that moves the links that in turn move the gripping dies to the closed position. As the motion begins, the spring has the least power but as the motion continues the power increases, owing to the position of the links, until it is almost irresistible, ending with the dies in the closed position and all centers in line, and when in that position of course nothing can release the grip. It will be seen at once that if the stock being fed to the machine should get caught in the dies, or if an accident happens, such as a wrench falling between the dies, the spring will yield and the toggles will not lock or come to their centers, and thus the machine is relieved of undue strain.

2½" HEADING AND FORGING MACHINE.

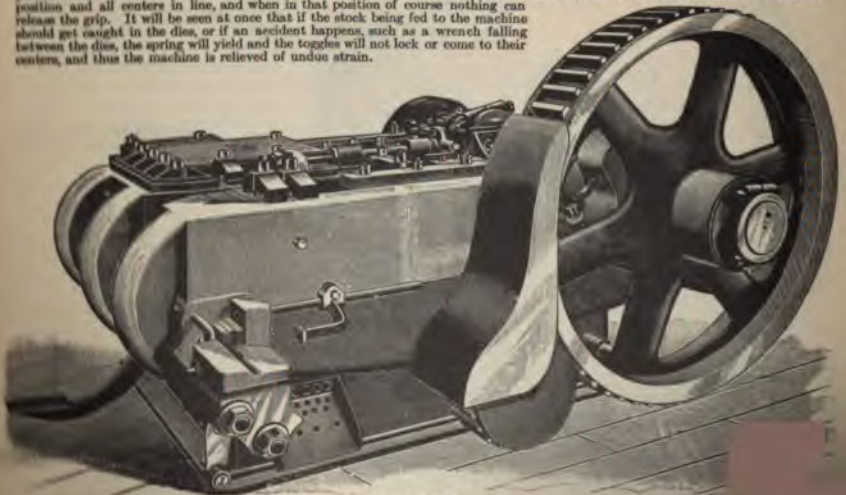


FIG. 11722.

BOLT HEADING, UPSETTING AND FORGING MACHINES.

3" HEADING AND FORGING MACHINE.

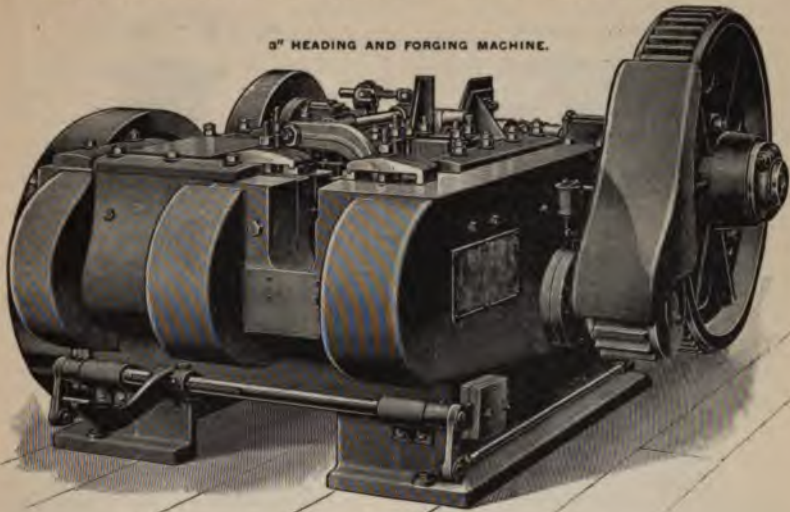


FIG. 11723.

DESCRIPTION FIGS. 11719 TO 11723.—Continued.

In addition to the office of the spring as a relief, it is also an adjustable time device. By time device we mean the time that the dies close and remain closed in relation to the advance of the heading plunger. For instance if rivets and small pieces are being made, it is necessary for the dies to remain closed an instant only. In making larger work, where it is desirable to gather more stock into the upset, the pitman that closes the dies may be lengthened (means for doing this being provided) so that the spring will compress as the machine goes over the center, and thus the dies will remain closed longer, the first eighth compression giving $\frac{1}{8}$ " more stock in the upset and the second eighth giving $\frac{1}{4}$ " more stock in the upset, and so on to the limit beyond which the material only folds into cold shuts. Thus it will be seen in addition to the relief being automatic, the time that the dies shall remain closed is adjustable to suit conditions.

This device has been thoroughly tried on the difficult jobs that long experience suggested as sure to try the machine to its limit and has been found to meet all requirements in a most satisfactory manner.

The parts in this machine are fewer in number, larger in their bearings and working surfaces, more convenient of access, less in the way in rapid operation and more self-contained than anything we have ever built in this line before.

The entire construction of the machine is the best that special tools, skilled workmen, long experience and efficient superintendence can make it.

These machines are built in nine sizes, $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", 2", 2" geared, $2\frac{1}{2}$ ", 3" and 4". The five smaller sizes are furnished with countershaft, wrenches and one pair of sample dies each for making one diameter bolts, rivets and upsets. The four larger sizes are each furnished with countershaft, wrenches and one pair of bolt dies.

SPECIFICATIONS.

Size.	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	2"	2" Geared.	$2\frac{1}{2}$ "	3"	4"
Floor space occupied.....	5' 8" x 3' 6"	5' 4" x 7'	5' 4" x 7'	6' 2" x 5'	7' 5" x 9' 2"	.....	5' 7" x 9' 3"	6' 4" x 10' 1"	9' 3" x 5' 10 $\frac{1}{2}$ "
Speed, revolutions per minute.....	75	75	75	60	55	.....	50	45	30
Net weight.....	5,800 lbs.	10,000 lbs.	11,000 lbs.	17,000 lbs.	26,000 lbs.	.....	36,000 lbs.	48,000 lbs.	76,000 lbs.

[†] Cast steel frame only.

[‡] Built with cast iron frame only.

[§] Built with either cast iron, or cast steel frame.

BOLT HEADING MACHINES.

NO. 1 BOLT HEADER.



FIG. 11724.

DESCRIPTION FIG. 11724.

This machine will head bolts from $\frac{3}{4}$ " to 1" inclusive and is regularly furnished with set of dies for heading $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{3}{16}$ ", 1"

The dies are made of either cast iron or steel, as desired.

Weight, 225 lbs.

Boxed for export, $37" \times 23" \times 13"$, 300 lbs.

NO. 2 BOLT HEADER.



FIG. 11725.

DESCRIPTION FIG. 11725.

This machine will head bolts from $\frac{3}{4}$ " to $1\frac{1}{2}$ " inclusive and is regularly furnished with set of dies for heading $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", 1", $1\frac{1}{4}$ ", $1\frac{3}{4}$ ", $1\frac{1}{2}$ ". The dies are made of either cast iron or steel, as desired.

Weight, 400 lbs.

Boxed for export, $37" \times 21" \times 22"$, 490 lbs.

NO. 2 EYE BENDER.

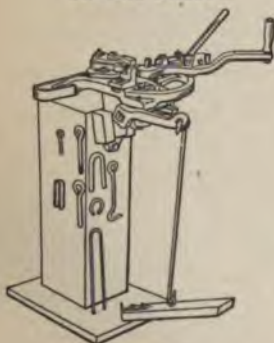


FIG. 11726.

EYE BENDERS.

DESCRIPTION FIG. 11726.

These machines bend hot stock and turn out perfect eyes and hooks, uniform in character and size.

Our system of gripping the end of the stock and carrying it around a forming pin, enables operator to turn eyes on the ends of long rods.

BUILT IN THREE SIZES.

No. 1. Takes stock up to and including $\frac{1}{2}$ ". Bends rings and eyes up to $2\frac{3}{4}$ " outside diameter.

No. 2. Takes stock up to and including $\frac{3}{4}$ ". Bends rings and eyes up to 3" outside diameter.

No. 3. Takes stock up to and including $1\frac{1}{2}$ ", round or square. Bends eyes up to 7" outside diameter.

EYE BOLT MACHINES.

DESCRIPTION FIG. 11727.

Handles iron up to $\frac{3}{4}$ " or even $\frac{7}{8}$ " in diameter and smaller. Has three dies, the two clamping dies as well as the rotating die. Stock is automatically clamped, bent, and discharged, and the mandrel automatically retreated. This machine is quite rapid in operation. The largest outside diameter which can be handled is $3\frac{3}{4}$ ". The largest automatically retreating mandrel is $1\frac{3}{4}$ ", but larger mandrels can be used if the work is pulled off by hand.

DESCRIPTION FIG. 11726.

The No. 2 eye bender possesses features which no other machine has, and in a general way we may say there is nothing like it made, possessing the capacity, range and other points for this class of work. It attracted a great deal of attention at the World's Fair.

This machine has an adjustable stroke. This is a great advantage. By shifting the stop a man may increase or shorten the stroke, so that if the iron is not bent quite far enough, it is

NO. 2 EYE BOLT MACHINE.

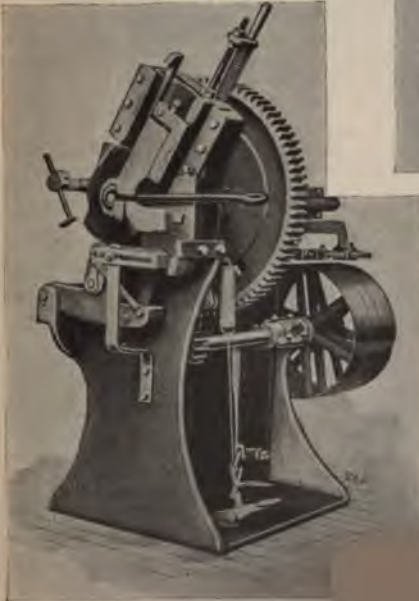


FIG. 11726.

NO. 1 EYE BOLT MACHINE.



FIG. 11727.

simply a matter of shifting the stop instead of having to file or change the dies, or make new dies. Also the short stroke is very useful for short bends. It is double geared and runs with a narrow belt. Has automatic stop, and if jammed will relieve itself automatically without danger of breaking. In connection with the automatic stop we also have a cushion and what may be called a by-pass, so that the machine will stop without excessive jar, and the intermediate gear pinions and pulleys may continue revolving and stop more slowly while the main shaft and the main gear have already stopped. The machine in fact has been greatly improved in the last few years, and is practically noiseless in operation.

The largest outside diameter that this machine will handle is 6". The largest automatically retreating mandrel is 2" in diameter, although if the work is pulled and a larger mandrel may be used, and this is

TIRE BENDING MACHINES.

NO. 1 TIRE BENDER.



FIG. 11729.

Style E.—Hand machine with plain rolls.
Style F.—Hand machine with grooved rolls.

DESCRIPTION FIG. 11730.

This machine is very powerful and especially designed for very heavy work, but is adapted to bending from the lightest to the heaviest tires, taking $1\frac{1}{4}$ " to $1\frac{3}{4}$ " thick and to 10" wide. The upper and lower stationary rolls are geared together by very strong gears, and so arranged that the tire can be taken out after bending without removing any of the gears or rolls by slipping the side bar or brace off from the shaft of the top roll, when it will swing down on lower stud or shaft. For bending iron edgewise it is furnished with collars, which are slipped over the rolls to form a groove; same collars are also used when bending very light tires for a small circle. Rolls are made of steel.

Geared 18 to 1.

Weight, 1,000 lbs.

Boxed for export, 43" x 43" x 34", 1,155 lbs.

Made in two styles, as follows:

Style I.—Complete for hand.

Style J.—Complete with 18" x 4" tight and loose pulleys for power.

Speed for pulleys, about 60 turns per minute.

DESCRIPTION FIG. 11729.

NO. 1 MACHINE.

This is a strong and well made machine, having open side so that tires can be taken out without springing. The bearings or track of carriages on all our tire benders are planed perfectly parallel, which insures the tire going through the rolls and the ends coming together perfectly square. A pair of grooved rolls for bending iron edgewise is furnished when ordered. Also tight and loose pulleys can be fitted to the machine for power when desired. It will bend tires from the lightest to $\frac{3}{4}$ " thick by 5" wide.

Geared 9 to 1.

Speed for pulleys about 120 turns per minute.

Weight, 500 lbs.

Boxed for export, 34" x 22" x 21", 550 lbs.

The machine is made in four styles, as follows:

Style A.—Hand machine, with plain rolls.

Style B.—Hand machine with grooved rolls.

Style C.—With plain rolls and 16" x $3\frac{1}{2}$ " pulleys for power.

Style D.—With grooved rolls and 16" x $3\frac{1}{2}$ " pulleys for power.

NO. 2 MACHINE.

Similar to No. 1 machine, but smaller, bending iron up to 3" x $\frac{3}{4}$ ".

Geared 9 to 1.

Speed for pulleys about 150 turns per minute.

Weight, 250 lbs.

Boxed for export, 34" x 26" x 17", 300 lbs.

Built in four styles, as follows:

Style G.—With plain rolls and 14" x 3" pulleys for power.

Style H.—With grooved rolls and 14" x 3" pulleys for power.

NO. 3 TIRE BENDER.

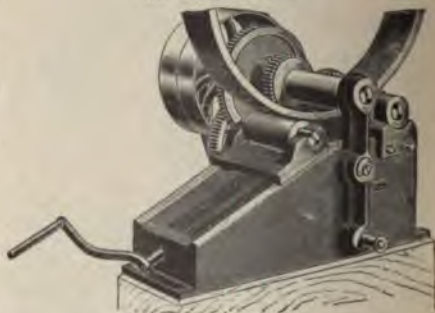


FIG. 11730.

TIRE BENDERS.

NO. 992 TIRE BENDER.



FIG. 11731.

NO. 808 TIRE BENDER.



FIG. 11732.

DESCRIPTION FIGS. 11731 AND 11732.

The No. 992 machine is designed for ordinary heavy work. Both upper and lower rolls are driven by power. It is usually driven by tight and loose pulleys, as shown, but may be supplied with motor drive if desired.

Fig. 11732 shows the No. 808 machine which is made more particularly for steel wheel work, largely for wide tires and not extremely heavy. It is a very complete machine in every respect. Both upper and lower rolls are driven. There is a guide roll for entrance and a back roll which is quickly adjusted for the different circles. Also guide rolls for the edge. The lower roll is adjustable for different thicknesses of tire, and when the yoke is taken off the front of the machine, the upper roll can be readily dropped by means of the long lever, and the tire taken out edgewise if desired.

The cut shows the side of the machine at which the tire enters. The machine as shown is with motor bracket, but is generally furnished belt driven.

The lower roll can be so adjusted that if an extraordinary strain comes on the machine on account of extra thickness of stock, the roll will drop and relieve the machine.

Full particulars in — weights, prices, etc., will be —

TIRE SHRINKERS.

NO. 1 TIRE SHRINKER.



FIG. 11733.

DESCRIPTION FIG. 11734.

NO. 3 MACHINE.

No. 3 is a large machine especially adapted for all sizes of tires, to $1\frac{1}{4}$ " thick, to 8" wide.

Weight, 400 lbs.

Boxed for export, 28" x 25" x 19", 500 lbs.

Directions.—When setting the machine, fasten it securely on a block about 1' high; fasten block to floor or ground in a solid manner; see that lever holder is put on so as to get the full use of cam. Use the longest dogs or clamps for thinnest tires. See that work when set has a bearing on machine under dogs as much as possible; use a strong, hard wood lever 8' or 10' feet long; fasten same in lever socket. Heat the work to a good white heat, and after bringing dogs down on work, apply the power to lever, bringing it down to a horizontal position.

NO. 4 MACHINE.

Same as No. 3, but smaller, taking tires to $\frac{3}{4}$ " thick, to 5" wide.

Weight, 225 lbs.

Boxed for export, 24" x 22" x 17", 300 lbs.

DESCRIPTION FIG. 11733.

NO. 1 MACHINE.

No. 1 will upset tires $\frac{5}{8}$ " thick by 4" wide. Is furnished with clamp in center, which is brought down on tire by means of wheel and screw, to prevent tire from kinking when being upset.

Weight, 150 lbs.

Boxed for export, 22" x 17" x 12", 185 lbs.

NO. 2 MACHINE.

Is the same as No. 1 without the clamp, wheel and screw, kinking of the tire being prevented by hammer in the hands of operator.

Weight, 125 lbs.

Boxed for export, 22" x 17" x 12", 160 lbs.

NO. 3 TIRE SHRINKER.



FIG. 11734.

BENDING AND STRAIGHTENING MACHINE.



FIG. 11735.

DESCRIPTION FIG. 11735.

This illustrates a motor driven bending and straightening machine. Bending ram has a quick adjustment by means of the hand wheel. The rear bending dies can be placed nearer the center of the machine if so desired.

Specifications, prices, etc., will be sent upon application.

BULLDOZERS.

DESCRIPTION FIGS. 11736 TO 11738.

Double Crank Gears.—In the bulldozer the main shaft holds up the crank gears and takes the end thrust, each gear receiving its power independently from its own pinion. But the main shaft has no torsional strain at all. In other machines, however, the power is transmitted torsionally from one center gear to both ends of the shaft, or from one end to the other end through the main shaft itself. Now, when the work is not located centrally on the cross head of the machine, as is frequently the case, the torsional stiffness of the shaft will not keep the cross head parallel or square. The end on which the pressure is most severe will yield, and the cross head be cramped in the gibs, and the work imperfect; and yet other machines but the bulldozer depend on this torsional capacity of the shaft. All who use the bulldozer are well aware how frequently the work is located unequally and not centrally on the cross head, so that the pressure is not central. This creates no difficulty on our bulldozer, since the cross head cannot deviate from its parallel motion on the bulldozer, being driven by crank gears at each end independent of each other.

Friction Clutch.—We have equipped the bulldozers with three different kinds of clutches: with our patent pawl key clutch, the common square jaw clutch, and also the friction clutch. The standard clutch used at the present time is the friction clutch, which we put on all our machines except the No. 1 double geared, on which there is not room. All other types and sizes have the friction clutch. We regard the friction clutch as quite an improvement, for several reasons.

1. The machine starts without perceptible shock or jar. Those using the larger machines, particularly, will appreciate the advantage of this.
2. The friction clutch lessens the danger from accidents.
3. With the friction clutch the machine can be stopped at any point. It is sometimes desired to drive the cross head forward and stop before quite completing the stroke, to see whether the work lies in the proper position in the forms, before giving the final squeeze.
4. The friction clutch is very useful in adjusting dies. It can be thrown part way in and the cross head advanced slowly, and let the dies strike to see whether they match.
5. The friction clutch can be adjusted as to slip under too severe a strain, and so relieve the machine.



FIG. 11737

NO. 0 BULLDOZER.



FIG. 11736.

Gibs.—It will be noted that the cross head is gibbed with tapered brass gibs, both vertically and horizontally, thus very accurately guided, with provision for taking up the wear.

Die space has been increased on the Nos. 1, 2 and 3 machines, the No. 1 being lengthened from 14" to 2", the No. 2 from 17½" to 30", and the No. 3 from 25" to 30". It is understood, of course, that where necessary we can furnish extra length of bed and die space or width for special work, charging an extra price, of course, for such additions, and we very frequently do this.

Hard steel plates on top of the ways.—The ways of the bulldozer are broad, flat and protected by hard steel wearing plates. While the bed does not wear greatly for years, yet if after many years it is necessary to replace the plates, it can be done at a slight expense.

BULLDOZERS.

NO. 8 BULLDOZER, MOTOR-DRIVEN.

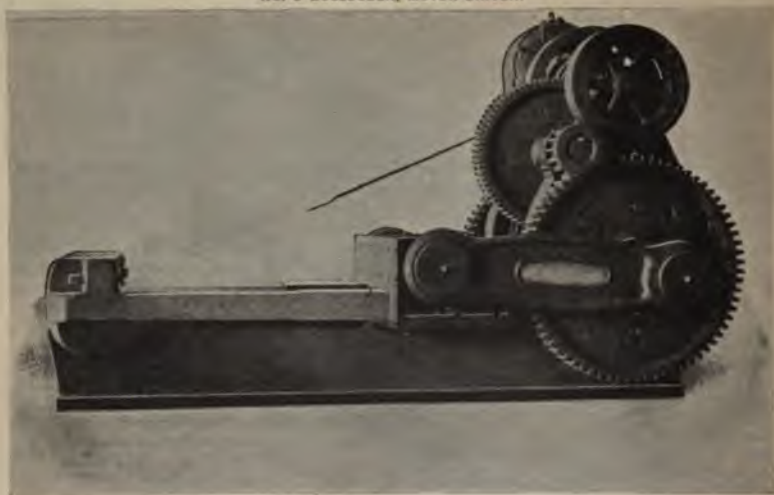


FIG. 11736.

DESCRIPTION FIGS. 11736 TO 11738.—Continued.

The End Lugs.—We make the end lugs of the bulldozer purposely low so that the dies can extend back of the lugs and over them, and also so that wing dies can swing around over them. We wish customers to bear in mind, however, that they can have the end lugs higher if they want them so, without extra cost. The tail screws for these lugs are made of hardened tool steel, so that they will not upset in the threads, and are of great advantage for adjusting dies. We generally furnish Nos. 9, 8 and 7 machines without tail screws.

The bolt holes are reamed and the bolts turned to fit. The nuts are locked from getting loose, and all of the keys are of tool steel. Automatic stops furnished, when desired, at additional cost.

These machines can be furnished with belt, engine or motor drive, as desired.

SPECIFICATIONS FIGS. 11736 TO 11738.

	0	1	2	3	4	5	6	7	8	9
Length over all.....	7' 6"	7' 6"	8' 0"	9' 3"	10' 8"	11' 8"	12'	15' 5"	15' 9"	17' 10"
Width over all.....	2' 6"	3'	3' 7"	4'	4' 7"	6' 3"	6' 3"	6' 9"	7' 4"	8' 10"
Face of cross head.....	5' x 18"	20½" x 5'	24½" x 6½"	30" x 7"	45" x 7½"	63" x 12"	63" x 12"	70" x 16"	72" x 16"	89½" x 16"
Movement of cross head.....	8"	14"	16"	16"	18"	20"	20"	22"	24"	24"
Space for dies with cross head forward.....	24"	24"	30"	30"	35"	38"	38"	45"	45"	49"

STEAM HAMMERS.

DESCRIPTION FIG. 11739.

The regular type hammer is designed for general blacksmith work and is built in four sizes, as follows:

	No. 1.	No. 2.
Diameter of cylinder.....	6"	8"
Length of stroke or lift.....	16"	18"
Weight of falling parts.....	250 lbs.	450 lbs.
Bed plate.....	3' 6" x 2' 3"	3' 11" x 2' 8½"
Total height from bottom of bed plate.....	7' 2"	8' 6"
Total weight.....	3,800 lbs.	5,200 lbs.
Diameter steam pipe.....	1½"	1½"
Diameter exhaust pipe.....	2"	2"
Usual die face.....	3½" x 7"	4½" x 8"
Face of ram.....	4¾" x 7"	5½" x 8"
Distance center die to column.....	11½"	15"
	No. 3.	No. 4.
Diameter of cylinder.....	10"	12"
Length of stroke.....	22"	30"
Weight of falling parts.....	700 lbs.	1,500 lbs.
Bed plate.....	4' 0½" x 3' 1½"	6' 1" x 4' 3"
Total height.....	9' 8"	12"
Total weight.....	8,200 lbs.	18,700 lbs.
Diameter steam pipe.....	2"	2½"
Diameter exhaust pipe.....	2½"	3"
Usual die face.....	5½" x 10"	7" x 14"
Face of ram.....	6¾" x 10"	9" x 14"
Center of die to frame.....	16½"	18"

REGULAR
TYPE
"BELL"
HAMMER.

FIG. 11739.

"BELL" STANDARD
GUIDE SINGLE FRAME
STEAM HAMMER.

FIG. 11740.

DESCRIPTION 11740.

Workmanship and Material.—These hammers are built as an exclusive specialty, and it therefore goes without saying that only the most suitable materials are used, and the most accurate quality of workmanship is thus assured. This being backed up by long years of practical experience in the manufacture and use of these machines, furnishes the keynote to their past and continually increasing success, and a rigid adherence to the highest standard will always be maintained.

Design.—Very heavy and massive, with plenty of metal distributed where it will do the most good.

Operation.—Double-acting, taking steam (or hammer can be operated without any changes, by compressed air) at top and bottom of stroke, through steam ports, arranged to give maximum force of blow, but under perfect control, and easy regulation and variation in the force or position of same, continuously sustained automatic operation, with sensitive regulation by the throttle valve, which can be also connected to foot treadle, saving the service of helper when working the hammer automatically.

Valve Motion.—Extremely simple, with few working parts, and giving the most accurate and sensitive control to the blow, not connected except by sliding contact with the hammer head. It is free from all shock or jar of the blow, is therefore of the most durable and efficient construction, and requires no attention except proper lubrication.

Main Frame.—Casting made from pattern without cores, except column core, thus giving absolute uniformity, thickness and shape of metal. Column of box section, cored out. Bed plate cast in one piece, solid with frame, with heavy ribs below the floor line, running lengthwise, and heavy reinforcement around die block opening.

Description continued on following page.

STEAM HAMMERS.

DESCRIPTION FIG. 11740.—Continued.

Reinforced Guides.—Latest improvement consisting of making the main casting at the point to which the lower end of slides are bolted, fully 60 per cent. stronger and heavier than heretofore, and increasing greatly the strength by the addition of a vertical flange on the cross web, tying the lower ends of the slide faces together in the main casting. This entirely overcomes a weak point in this type of hammer, and greatly strengthens the point where the most strain comes.

Stiffened Column.—This consists in adding to the pattern, and casting solid on the column of the main frame, a heavy band or web extending from around the bottom of the slides down each side of the column to the bed plate, and joining at that point the heavy ring around the die block opening. This greatly adds to the resistance to shearing at any point in the column.

Cylinder.—The cylinder casting is in one piece, with piston and throttle valve chests, and has extra heavy flange, top and bottom, which latter are reinforced by heavy vertical ribs. Cylinder is dowel pinned, and through bolted to the frame with fitted bolts in reamed holes. Cylinder is accurately bored and faced, and the piston valve bushing is scraped and fitted after being put in place.

Valves.—Main working valve of the balanced piston type, working without friction in a removable bushing, which has steam port edges finished, thus giving uniform operation. Throttle valve is of the circular form, ground with emery in construction, to its seat and held tight by steam pressure.

Hammer Head.—Of hammered steel, with piston rod. Hammer head itself is set at the proper angle in the main frame casting, so as to permit drawing and finishing work either way of the dies, without the work interfering with the column. Head finished from the solid, having gang milled V grooves, which work in adjustable V slides, which are also gang milled, with special formed cutters. This gives perfect bearing to the working surfaces in contact. The slides are of heavy construction, through bolted to the main frame with spring washers on bolts, and are fitted iron and iron against taper gib extending entire length, and arranged for independent adjustment. Piston rod fitted to taper hole in head, the jam of which taper constitutes the real hold, but with safety pin to give warning in case of rod getting loose.

Die Block.—In two pieces, with the top cap above bed plate, which can be easily removed when more space is required for special shape work, upsetting, etc. The lower die can then be put into dovetail slot in lower die block. The lower die block is very heavy, to absorb the force of blow, extending below the bed plate, and having large square base. The die block is entirely independent of the bed plate, and no strain is put on the bed plate from hammering.

Dies.—One set plain forging dies, regularly furnished of special open hearth steel.

Piston.—Can be raised above top of cylinder to examine or renew packing rings without disconnecting from hammer head, by simply removing the buffer springs and the piston rod gland, which is in halves.

Spiral Springs.—Are fastened to the under side of the reinforced cylinder flange, to cushion the up stroke, and prevent injury in case of careless handling, there still being clearance between top of piston and cylinder cover, when these springs are compressed solid.

Pipe Connections.—Stuffing box or expansion joint connections are in the cylinder casting, for steam and exhaust pipes.

Oil Pump.—Hand force oil pump furnished with the hammer, and pipe connected to the throttle valve. (It is, however, recommended that a slight feed lubricator be attached to the steam pipe some distance away from the hammer, at a point where there is not much vibration to the piping.)

Foot Treadle.—This attachment can be furnished at slight extra cost, for controlling the automatic action of the hammer, and will be found very useful for some classes of work, on hammers up to and including 850 lbs. falling weight.

Testing.—Every hammer is thoroughly tried with steam at the works before shipment. Plan of foundation and directions for setting are furnished with each hammer, so that the foundation can be finished ready to set the hammer on its arrival.

Sizes.—These hammers are rated entirely by the actual scale weight of the falling parts, and do not take into consideration the added force of the blow from the steam or air pressure on top of the piston.

SIZES AND SPECIFICATIONS.

FIG. 11740.

Weight of falling parts.....	350 lbs.	600 lbs.	850 lbs.	1,100 lbs.	1,250 lbs.	1,600 lbs.	2,000 lbs.
Diameter of cylinder.....	5½"	7"	8½"	10"	11½"	12"	13"
Length of stroke.....	15"	22"	24"	28"	32"	34"	38"
Total weight.....	7,200 lbs.	11,000 lbs.	13,500 lbs.	19,000 lbs.	24,000 lbs.	28,000 lbs.	35,000 lbs.
Weight of die block.....	3,300 lbs.	5,300 lbs.	6,000 lbs.	8,500 lbs.	10,000 lbs.	12,000 lbs.	19,000 lbs.
Usual die face.....	8" x 8"	5½" x 11"	6" x 13"	7" x 13½"	7½" x 14"	8½" x 15"	9" x 15½"
Face of ram.....	8½" x 8½"	7½" x 11½"	8" x 13½"	8½" x 14"	8½" x 14½"	9" x 15½"	10" x 16"
Distance between slides.....	13½"	11½"	13½"	14"	14½"	15½"	16"
Center of die to frame.....	14"	18"	21"	22½"	24"	26"	27"
Total height.....	8" 2"	9" 4"	10" 4"	11" 4"	12" 2"	13" 10"	15" 5"
Diameter steam pipe.....	1½"	1½"	2"	2½"	2½"	3"	3½"
Diameter exhaust pipe.....	3"	3"	2½"	3"	3"	3"	3"
Bed plate.....	3' 11" x 2' 0"	4' 7½" x 2' 10"	5' 3" x 3' 4"	6' 9" x 3' 7"	6' 9" x 3' 10"	6' 9" x 4' 2"	7' 2"

STEAM HAMMERS.

STANDARD SINGLE FRAME
HAMMER.



FIG. 11741.

SINGLE FRAME HAMMER
WITH RAM ON ANGLE.



FIG. 11742.

STANDARD DOUBLE FRAME
HAMMER.



FIG. 11743.

DESCRIPTION FIGS. 11741 TO 11746.

These hammers are of the very best design and are built of best quality of material throughout, making them the most satisfactory line on the market. The standard single frame hammers are built in nearly all sizes up to 3,000 lb. falling weight, the smaller sizes being built regularly for stock. The larger sizes of single frame hammers and the double frame and steam drop hammers are built to order only. In making inquiry for prices, advise the type of hammer desired, also weight of falling parts, or inform us of the character of work to be performed. Complete specifications will be sent with quotation.

6 TON DOUBLE FRAME HAMMER.



20 TON DOUBLE FRAME HAMMER.



FIG. 11745.
379

4500 LB. STEAM DROP
HAMMER.



FIG. 11748.

POWER HAMMERS.

THE FAIRBANKS POWER HAMMER.
REGULAR PATTERN.



FIG. 11747.

Fig. 11748 shows the spring mechanism. This will commend itself to any mechanic as a more practicable way of securing the elastic cushioned strokes, which is the essential feature of a power hammer, than any arrangement of leather straps, rubber cushions, compressed air, leaf springs, or curved grooves, that has ever been invented.

The entire working parts of the hammer are at the top, in full view of the operator, and every part is readily accessible, being easily operated by men of ordinary experience.

Adjustment of stroke is accomplished by loosening one nut on wrist pin and one bolt on cross head, and when at required places, again tightening.

The spring is adjusted at the factory for the correct blow, but one each $\frac{1}{16}$ " and $\frac{1}{4}$ " washers are sent with each hammer, one or both of which may be inserted at the ends of the spring, should it become necessary.

The treadle may be adjusted to accommodate the height desired by the operator. In the regular pattern hammer the treadle extends half way around the base as shown in Fig. 11747, but a special treadle to extend all around the base as shown in Fig. 11749 can be supplied at a slight extra cost and is a very desirable feature in many instances.

The lower die block and die are so arranged that they are readily adjusted. This is appreciated especially when special forming dies are used, as it is then necessary that the upper and lower dies be in perfect alignment to produce good work.

DESCRIPTION FIGS. 11747 TO 11756.

In presenting the Fairbanks power hammer for consideration by manufacturers, the company does so with a full degree of confidence in its excellence and usefulness, and feels sure that a close examination will show beyond question that it is especially adapted for the sort of work required in carriage factories, car works, edge tool and general job shops.

The hammer, as will be seen by the accompanying illustrations, is operated by an adjustable crank, the crank pin sliding in a groove in the crank disk, allowing the operator to lengthen or shorten the stroke at will. Motion is applied to the head or ram by means of a connecting rod to which is secured a cross head having a split sleeve, and to this cross head are hinged two side arms these in turn being directly connected to the ram by links. By the use of a steel spiral spring properly adjusted, the force and weight of the blow are many times multiplied, but with an elasticity that removes all danger of breakage, and, at the same time, the jar is so thoroughly cushioned that it is not noticeable in the machine when the blow is struck. The head strikes a quick, sharp blow, at the rate of 200 to 500 blows per minute, according to the size of the machine, and instantly gets away from the work, thereby avoiding any chilling of the stock.

No hammer made at the present time has fewer parts than this one. The solid head of frame in which the crank shaft runs precludes all possibility of cap bolts getting loose or shaft getting out of line. While every effort has been made to have few parts, nothing necessary for the good working of the hammer has been omitted.

SPRING MECHANISM USED ON
FAIRBANKS POWER HAMMER.



FIG. 11748.

POWER HAMMERS.

DESCRIPTION FIGS. 1174T TO 11766.—Continued.

The compact design of the hammer will recommend itself at once. It not only saves floor space, but also permits of placing the hammer in the most convenient position with relation to the forges in conjunction with which it is used.

The small amount of power required to run this hammer is an agreeable surprise to all who use it; as power means money whatever the motive force may be, this economic feature will especially commend the Fairbanks hammer.

In the construction of this hammer all parts are of such proportion as to insure durability. The material used is the best that can be obtained. The ram or hammer-head, links, sleeve and connection, are of steel castings; the crank, joint pins and side arms of forged steel; the castings for the other parts of a special formula to insure strength and durability, and every piece used is of iron or steel except the bronze bushing in the crank connection. Under the most trying work the Fairbanks hammer has been more than a match in durability for any hammer thus far built, the cost of repairs being practically nothing. Instances are on record of their having been run for six years on steel work with a total cost for repairs not exceeding \$2.00.

SAMPLES OF WORK PRODUCED ON FAIRBANKS POWER HAMMERS.



FIG. 11750.

THE FAIRBANKS POWER HAMMER WITH SPECIAL TREADLE.



FIG. 11740.

The Fairbanks power hammer can be adapted to a great variety of work by providing special dies. With proper dies large quantities of forgings of uniform size and shape can be turned out, as for instance, carriage work, stone cutter's tools, edge tools, scythes, hatchets, shoe dies, welding gas tubes, etc. The dies always come squarely together in any size of thickness of work, so that parallel sides are insured when wanted. In the following illustrations, Fig. 11750 represents a few of the many kinds of work now being made;

POWER HAMMERS.

REGULAR DIES.



FIG. 11751.

DESCRIPTION FIGS. 11747 TO 11756.—Continued.

Fig. 11751 is the form of die regularly furnished with the hammer and Figs. 11752 to 11756 inclusive, illustrate a few of a great variety of dies which have been designed. These dies are made from steel blocks and when special designs are required it necessitates experimental work and a greater percentage of hand labor. This makes them more expensive than the regular dies, but in the end it is an economy for the purchaser. We have every facility for making special dies and are at all times ready to furnish estimates.

SPECIAL DIES.



FIG. 11752.

SPECIAL DIES.



FIG. 11753.

SPECIFICATIONS FIGS. 11747 TO 11756.

Size.	Weight of Ram, Pounds.	Size of Base.	Diameter of Driving Pulley.	Size of Bolt.	Average Number of Blows per Minute of Countershaft.	Adapted to Work Stock.	Height, Foundation to Center of Shaft.	Size of Dies.	Horse-Power Required.	Total Weight, Pounds.
O	25	18 $\frac{1}{2}$ " x 28 $\frac{1}{2}$ "	10"	3 $\frac{1}{2}$ "	500	1"	63"	3 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ "	X	1,260
A	50	20 $\frac{1}{2}$ " x 29 $\frac{1}{2}$ "	12"	3 $\frac{1}{2}$ "	350	1 $\frac{1}{2}$ "	74"	4 $\frac{1}{2}$ " x 4 $\frac{1}{2}$ "	X	1,910
B	75	21 $\frac{1}{2}$ " x 31 $\frac{1}{2}$ "	12"	4 $\frac{1}{2}$ "	325	2"	80"	5 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ "	X	2,440
C	100	22 $\frac{1}{2}$ " x 34"	14 $\frac{1}{2}$ "	4 $\frac{1}{2}$ "	300	2 $\frac{1}{2}$ "	87"	6 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ "	X	2,910
D	125	23 $\frac{1}{2}$ " x 35 $\frac{1}{2}$ "	15 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	275	3"	94"	7 $\frac{1}{2}$ " x 7 $\frac{1}{2}$ "	X	3,325
E	150	25" x 38 $\frac{1}{2}$ "	16"	5 $\frac{1}{2}$ "	250	3 $\frac{1}{2}$ "	101"	8 $\frac{1}{2}$ " x 8 $\frac{1}{2}$ "	X	4,235
F	200	29 $\frac{1}{2}$ " x 42 $\frac{1}{2}$ "	18 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "	185	4"	110"	9 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ "	X	5,500
G	250	32 $\frac{1}{2}$ " x 46 $\frac{1}{2}$ "	17 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	300	4 $\frac{1}{2}$ "	120"	10 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ "	X	6,400

SPECIAL DIES.



FIG. 11754.

SPECIAL DIES.



FIG. 11755.

COUNTERSHAFT FOR FAIRBANKS POWER HAMMER



FIG. 11757.

SPECIAL DIES.



FIG. 11756.

DESCRIPTION FIG. 11757.

Although a countershaft is not regularly provided with the Fairbanks hammer, in many cases it is impossible or undesirable to belt the hammer directly from the line shaft, and in order to take care of this condition we have designed special countershafts for all sizes of hammers. Details of these countershafts will be found on following page.

THE FAIRBANKS COMPANY

POWER HAMMERS.

DESCRIPTION FIG. 1175T.—Continued.

DETAILS OF COUNTERSHAFTS.

For Hammer Number	G	A	B	C	D	E	F	G
Speed of countershaft, revolutions per minute.....	385	323	271	279	240	225	207	207
Diameter of smooth pulley.....	11 $\frac{1}{2}$ "	13 $\frac{1}{2}$ "	13 $\frac{3}{4}$ "	15 $\frac{1}{2}$ "	17 $\frac{1}{2}$ "	19 $\frac{1}{2}$ "	19 $\frac{1}{2}$ "	19 $\frac{1}{2}$ "
Width of smooth pulley.....	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "	7 $\frac{1}{2}$ "	7 $\frac{1}{2}$ "
Length of hanger.....	10" to 12"	10" to 12"	12" to 14"	12" to 14"	14" to 16"	14" to 16"	16" to 18"	16" to 18"

DESCRIPTION FIG. 1175B.

This illustration shows the Fairbanks power hammer fitted with a special anvil and die block adapted for handling forgings where it is necessary to work up to a shoulder, as in drawing fork tines, T irons and a variety of carriage, wagon and agricultural work. Any size of Fairbanks hammer can be thus arranged at slight extra cost.

DESCRIPTION FIG. 1175C.

The illustration shows a device for welding tires which can be attached to any Fairbanks hammer, the extra parts necessary being the tire guard or gauge, and special dies. The upright guard which is bolted to both the face plate and frame, performs two functions, viz., it protects the tire from the working parts of the hammer, and also gauges the top of the tire with respect to the dies. The slant which the guard takes is at right angles to the inclined working surface of the dies, and the position of the work

THE FAIRBANKS POWER HAMMER.
Fitted with Tire Welding Attachment.



FIG. 1175D.

is determined by bringing the tire up against the shoulder on the dies, and in this manner the weld is made even with the curve of the tire. The bottom die is straight while the top die is convex.

At the rear ends of the dies a short portion is left straight which can be used for truing up the edges of the tire.

When the hammer is used for ordinary work, the regular dies may be inserted and the work performed without removing the guard, the latter being so located that it does not interfere with the work.

Hammers are adapted to weld tires of the following dimensions:

Capacity.....	Diameter of Tire.....	Width of Face.....	Thickness of Iron.....
50 lb. hammer.....	24" to 50"	0 to 2"	$\frac{1}{8}$ " to $\frac{1}{2}$ "
75 lb. hammer.....	26" to 32"	0 to 3"	$\frac{1}{8}$ " to $\frac{3}{4}$ "
100 lb. hammer.....	28" to 36"	0 to 4"	$\frac{1}{8}$ " to $\frac{3}{4}$ "
125 lb. hammer.....	30" to 60"	0 to 5"	$\frac{1}{8}$ " to $\frac{3}{8}$ "
150 lb. hammer.....	32" to 64"	0 to 6"	$\frac{1}{2}$ " to 1"

Note: This cut does not show our latest type of hammer. All hammers are now built with open back frames as shown in Figs. 1174Z and 11749.

SPECIAL PATTERN HAMMER.



FIG. 1175E.

DROP HAMMERS.

NO. 3 PLAIN DROP HAMMER.

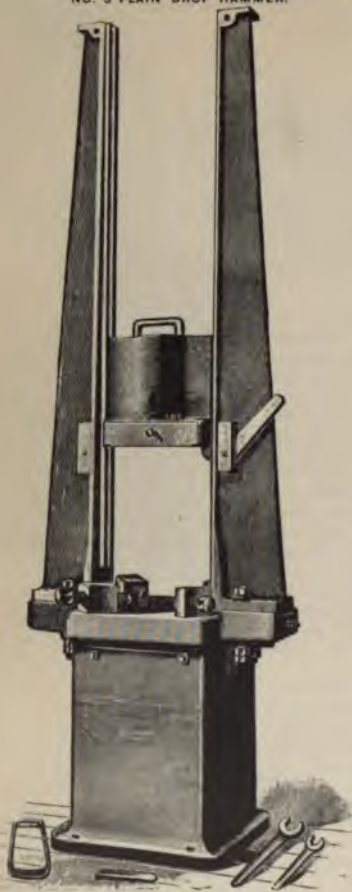


FIG. 11760.

the hammer is stationary or falling the belt is held away from the surface of the pulley, thus increasing the force of the blow and prolonging the life of the belt.

Plain drop presses are used for hollow ware, spoons, ladles, sugar bowls, cream pitchers, looking glass backs, large metals, etc., and are adapted for work which requires the metal to be set or dapped into the dies before the finishing blow is struck.

Note: Countershaft is furnished at extra cost only.

For list of sizes and specifications, see following page.

DESCRIPTION FIG. 11760.

The plain drop press, shown in the illustration, is made in three sizes. The two smaller sizes, $1\frac{1}{2}$ and 1, may be operated by hand or foot, but power is recommended in every case where it can be obtained.

One of the most valuable of our recent improvements is the method of adjusting the movable upright. The heads of the adjusting screws are counterbored, one into the base, and the other into the upright, as shown in the cut; this method prevents the screws from breaking. The screw in the base is for the adjustment, and the one in the upright for a check screw to lock the upright in position, so that when locked it cannot be altered by the blow of the hammer.

The anvil is extra heavy in proportion to the weight of the hammer, while the poppets are made from forged steel, finished all over and fitted accurately into the base. They are held in place by dove-tail screws, which fasten the poppets securely in their proper position.

Poppet screws are made from crucible steel, finished, hardened and tempered. The screws have a fine pitched thread which overcomes the tendency to work loose, and allows accurate adjustment of the dies.

The uprights are extra heavy, fastened to the anvil by heavy bolts, with check nuts to prevent them from jarring loose. Ears are provided at the top of the uprights to attach tie rods if necessary. The uprights are so constructed that the latch for holding the hammer can be used on either side, as desired.

The eye in the hammer for the strap is made of the best forged iron, cast into the body of the hammer, obviating breakage, which is so common with hammers made entirely of cast iron or steel castings.

The die holder, or "pick-up," is fastened in the hammer, either by a dovetail or taper shank, as required.

Drop press countershafts, Figs. 11761 to 11763, are fitted with either plain flange pulleys or patent lifters. We recommend, however, the patent power lifter, which utilizes the friction between the pulley and the belt only when required to lift the hammer. When

DROP HAMMERS.

SPECIFICATIONS FIG. 11760.

No. of Hammer.....	1/2	1	1X	2	2X	3	3X	5	6	8
Weight of hammer.....	50 lbs.	100 lbs.	150 lbs.	200 lbs.	250 lbs.	300 lbs.	350 lbs.	500 lbs.	600 lbs.	800 lbs.
Weight of savi.....	700 lbs.	1,250 lbs.	1,800 lbs.	2,450 lbs.	3,000 lbs.	3,650 lbs.	4,300 lbs.	6,450 lbs.	11,000 lbs.	14,000 lbs.
Weight of press.....	1,000 lbs.	1,750 lbs.	2,500 lbs.	3,250 lbs.	3,900 lbs.	4,700 lbs.	5,500 lbs.	8,000 lbs.	14,000 lbs.	17,500 lbs.
Weight, domestic shipment.....	1,100 lbs.	1,750 lbs.	2,600 lbs.	3,300 lbs.	4,100 lbs.	4,900 lbs.	5,800 lbs.	8,000 lbs.	14,500 lbs.	17,500 lbs.
Weight, foreign shipment.....	1,300 lbs.	2,100 lbs.	3,000 lbs.	3,800 lbs.	4,600 lbs.	5,400 lbs.	6,300 lbs.	9,000 lbs.	15,500 lbs.	18,500 lbs.
Height of savi.....	20"	27"	29"	33"	35"	39"	35"	55"	55"	50"
Height over savi.....	7" 8"	8"	8"	8" 5/8"	9"	8" 6"	8" 11"	9"	9"	9"
Size of beam.....	14" x 10"	17" x 15"	18" x 20"	21" x 24"	23" x 25"	23" x 27"	26" x 26"	29 1/2" x 26 1/2"	36" x 30"	44" x 40"
Traverse (maximum).....	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"
Length of uprights.....	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
Distance between uprights.....	7 1/2"	8 1/2"	10 1/2"	11 1/2"	13 1/2"	14"	15 1/2"	17"	19"	24"
Distance between supports (optional).....	0"	0"	0"	11"	12"	12"	14 1/2"	16"	18 1/2"	23" x 26"
Size of base of hammer.....	6 1/2" x 5"	8" x 6"	10" x 6"	12 1/2" x 6 1/2"	12 1/2" x 7 1/2"	13 1/2" x 8 1/2"	14 1/2" x 8"	16" x 11"	Special	Special
No. of countershaft.....	2	2	4	4	4	4	4	Special	Special	Special
Speed of countershaft.....	100 rev.	90 rev.	85 rev.	85 rev.	80 rev.	80 rev.	80 rev.	Special	Special	Special
Size of tight and loose pulleys.....	17" x 2 1/2"	14" x 4"	16" x 4 1/2"	18" x 4 1/2"	18" x 6"	20" x 6"	20" x 7"	22" x 8"	22" x 8"	22" x 8"
Size of lifting pulley on countershaft.....	12" x 2 1/2"	12" x 4"	16" x 4"	16" x 4"	18" x 5"	18" x 6"	18" x 6"	18" x 8"	18" x 8"	18" x 8"
Flange space.....	18" x 2 1/2"	19" x 2 1/2"	21" x 3 1/2"	23" x 3 1/2"	24" x 4"	26" x 4 1/2"	28" x 4 1/2"	22" x 5 1/2"		

POWER LIFTER FOR PLAIN DROP HAMMER.

DESCRIPTION FIG. 11761.

One of the simplest styles of power lifters for drop hammers; a belt is attached to the hammer and drawn over the flange pulley. The pulley revolves in the direction of the rising hammer. When the operator pulls down on the end of the belt, the friction between the belt and the face of the flange pulley causes the belt to revolve with the pulley, lifting the hammer to any desired height.



FIG. 11761.

SPECIFICATIONS.

Size.....	Diameter.	Belt.	Hammer.	Dist. of shaft.
No. 1.....	12"	2 1/2"	Up to 80 lbs.	1 1/2"
No. 2.....	12"	4"	100 to 125 lbs.	1 1/2"
No. 3.....	16"	4"	150 to 200 lbs.	1 1/2"
No. 4.....	16"	5"	250 to 300 lbs.	1 1/2"
No. 5.....	16"	6"	350 to 400 lbs.	2 1/2"
No. 6.....	16"	8"	450 to 500 lbs.	2 1/2"
No. 8.....	20"	10"	600 to 800 lbs.	2 1/2"
No. 10.....	24"	12"	900 to 1,000 lbs.	2 1/2"

PATENT POWER LIFTER FOR PLAIN DROP HAMMER.

DESCRIPTION FIGS. 11762 AND 11763.



FIG. 11762.

It is well known that for many years much time has been spent in trying to devise some mechanism to prevent the burning the belt by back friction when stamp hammers are lifted by power. This has been accomplished by our patent lifter.

The illustration shows our lifting pulley mounted on a countershaft. This pulley is made in three parts; the two outside parts, which are separate pulleys with a flange on one edge, are fastened to the shaft; the inside pulley or disk, which carries the belt-lifting segments, is free to revolve in either direction according as the hammer is moving up or down.

When the hammer is being raised the central segments are depressed by the force of the pull on the lifting strap, allowing the belt to come down on the revolving pulleys. When the hammer reaches the desired height and is allowed to fall, the belt is raised from the face

DROP HAMMERS.

PATENT POWER LIFTER IN DETAIL.



FIG. 11763.

SPECIFICATIONS.

Size.	Diameter.
No. 1	12"
No. 2	12"
No. 3	16"
No. 4	16"
No. 5	16"
No. 6	16"
No. 8	20"
No. 10	24"

DESCRIPTION FIGS. 11761 TO 11762.—Continued.

of the pulleys by the segments, which are pushed out by springs, and these segments revolving with the belt do away with all back friction, and as compared with the ordinary plain flange pulley lifter, there is a material gain in the force of the blow.

This lifter can be applied to any plain drop press where a plain power lifter is now employed.

Belt.	Hammer.	Diameter of shaft.
2½"	Up to 80 lbs.	1½"
4"	100 to 125 lbs.	1¾"
4"	150 to 200 lbs.	1¾"
5"	250 to 300 lbs.	1¾"
6"	350 to 400 lbs.	2½"
8"	450 to 500 lbs.	2½"
10"	600 to 800 lbs.	2½"
12"	900 to 1,000 lbs.	3"

DESCRIPTION FIGS. 11764 AND 11765.

Automatic drop presses, shown in the following illustrations, are made in eight sizes, and are designed to rapidly produce uniform work in large quantities. These presses are self contained, the driving mechanism being fastened to the base, where it is of easy access. They are operated in the same manner as a board drop, either with foot or hand trip.

The hammer is lifted entirely by power, and only required to be tripped by the operator. Both hands are required to operate the driving mechanism, unless furnished with treadle and safety device.

The guides for the hammer are substantially fastened, and cannot be thrown out of line by strain or vibration. The left guide is adjusted by a side-threaded screw, so that all wear may be taken up. Removable bronze bushings are used throughout, except the bearings at the top of the uprights of the large hammers, which are fitted with roller bearings.

The instantaneous clutch used in this machine is one of the most important features of its construction, acting immediately on the rebound of the hammer. When the clutch is released the hammer is at the top of the stroke, remaining securely locked in position until released by the tripping mechanism, which is so constructed that only one blow can be made, unless set for continuous work.

The eye in the hammer for the strap is made of the best forged iron cast into the body of the hammer, obviating breakage so common with hammers made entirely of cast iron or steel castings. The die holder, or "pick-up," is fastened in the hammer either by a dovetail or taper shank, as required.

Poppets are made from forged steel, finished all over and fitted accurately into the base, being fastened in place by dowel screws, which hold the poppets securely in their proper position. Poppet screws are made of crucible steel, finished, hardened and tempered, and are provided with a fine pitched thread, which overcomes the tendency to work loose, and allows accurate adjustment of the dies.

Description continued on following page.

NO. 1 AUTOMATIC DROP HAMMER.

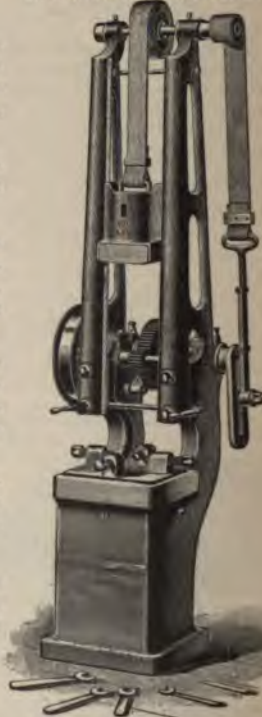


FIG. 11764.

THE F. A. IRBANKS COMPANY

DROP HAMMERS.

DESCRIPTION FIGS. 11764 AND 11765.—Continued.

The length of the stroke can be quickly changed by varying the length of the crank motion. The adjustment of the dies is easily performed, the flange pulley being turned by hand to raise or lower hammer during the setting, and in the larger sizes a bar is provided. Under suitable conditions ten to twenty thousand pieces should be struck in a day of ten hours; the output should be double that of a plain drop. These machines are used in the manufacture of lock parts, clock and watch gears, suspender buckles, cutlery, carriage trimmings, piano hardware, bicycle and typewriter parts, embossing, etc., etc.

NO. 3 AUTOMATIC DROP HAMMER.

SPECIFICATIONS FIGS. 11764 AND 11765.

No. of Hammer.....	4	1	2	3	4	5	8	12.
Weight of hammer, lb.....	50	100	200	350	400	500	800	1,200
Weight of anvil, lb.....	850	1,400	3,050	4,050	5,000	7,000	11,500	22,000
Weight of press, lb.....	1,350	2,000	4,100	5,400	7,000	9,200	15,000	30,000
Weight, domestic shipment, lb.....	1,400	2,100	4,170	5,550	7,300	9,400	16,000	30,500
Weight, foreign shipment, lb.....	1,650	2,400	4,500	6,000	8,200	9,800	17,000	32,000
Height over anvil.....	20"	24"	27"	30"	30"	33"	40"	46"
Height over all.....	9"	7" 6"	8" 6"	9" 3"	9"	9" 10"	11" 2"	11" 8"
Size of base.....	10" x 10 1/2"	17" x 18"	22" x 20"	25" x 27"	27" x 31"	30" x 33"	39" x 39"	41" x 40"
Stroke (maximum).....	36"	38"	38"	48"	48"	48"	52"	48"
Length of upright.....	40"	50"	53 1/2"	59"	64 1/2"	61 1/2"	71 1/2"	88"
Distance between uprights.....	7"	8 1/2"	12 1/2"	13 1/2"	15 1/2"	17 1/2"	19"	24"
Distance from center to back.....	6 1/2"	7"	8 1/2"	8 1/2"	9 1/2"	10"	12 1/2"	17 1/2"
Distance between opposite flanges.....	6 1/2"	7 1/2"	9 1/2" x 1 1/2"	12 1/2"	14"	15"	18"	23" x 20"
Greatest admissible die space.....	6 1/2" x 8"	8 1/2" x 9 1/2"	10" x 12"	10" x 12"	14" x 14"	14" x 16"	16" x 18"	23" x 25"
No. of countershaft.....	3	3	4	4	4	4	Special 240	Special 300
Speed of countershaft, rev.....	250	225	240	280	300	300	Special 240	Special 300
Size of driving pulley on countershaft.....	10" x 2"	12" x 3"	14" x 3 1/2"	15" x 4"	16" x 5"	16" x 6"	20" x 8 1/2"	22" x 8 1/2"
Size of light and loose pulleys.....	10" x 2"	12" x 3"	14" x 3 1/2"	15" x 4"	16" x 5"	16" x 6"	20" x 8 1/2"	22" x 8 1/2"
Proportion of gearing.....	1 to 4	1 to 3	1 to 3	1 to 3 1/2	1 to 3	1 to 3	1 to 3	1 to 10
Floor space.....	22" x 28"	28" x 40"	37" x 45"	41" x 50"	51" x 58"	54" x 58"	63" x 69"	79" x 87"

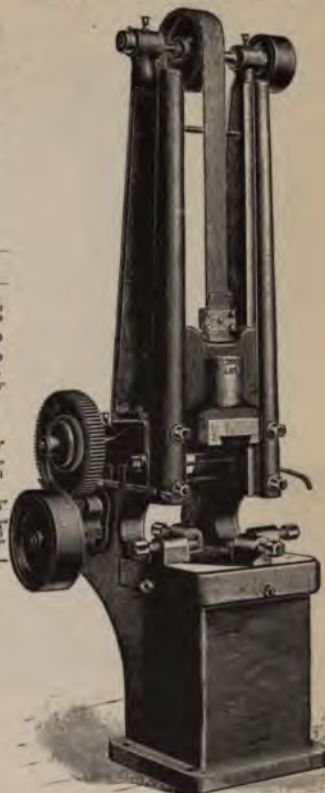


FIG. 11765.

DESCRIPTION FIG. 11766.

When so ordered, our plain and automatic drop presses are furnished with jack dies, also called rag jacks, or pick-ups. They are made from the best steel forgings, slotted at right angles to receive the forcer, and then hardened. In ordering, give size of face, and state whether round or square face is desired.

JACK DIES FOR DROP HAMMERS.



FIG. 11766.

No.....	1	2	3	4	7	8
Size of face.....	2 3/4" or less	3" to 3 1/4"	3 3/4" to 3 5/4"	4" to 4 1/2"	5 1/4"	6"

BOARD DROP HAMMERS.

600 LB. BOARD DROP HAMMER.

DESCRIPTION FIG. 11767.



FIG. 11767.

Also please note, we will furnish when desired, two automatic trips on the drop rod; the upper one for full blow and the lower one for light blow, so that the operator can instantly change to automatic trip for light blow as well as an automatic trip for heavy blows. This is extremely useful on most classes of work and well worth having, but we do not furnish the extra trips except to order.

It should also be noted that while the height of lift in our judgment is ample and that the tendency nowadays is to use heavier hammers and low falls, yet if desired we can furnish longer uprights. We can also make hammers wider between the guides to order; and other special changes, as they may be needed, fitting up the hammer, for instance, with steel poppets if wanted instead of the die slot.

The special points which we claim with regard to our make of board drop hammers are enumerated herewith:

First. The automatic trip on these hammers, which is patented, is smooth in operation. It has a free oscillating movement, and the dog which engages the tapered surface of the ram can be adjusted on the pivot shaft for different thicknesses of dies.

Second. Massiveness of construction throughout. The uprights or guides are particularly heavy. The lugs for the adjusting screws of the anvil are extra long. Anvils are regularly made fifteen times the weight of the ram, and can be made heavier to order.

Third. Our pulleys are on the same shaft, the rolls being connected by steel gears. The two shafts are thus always maintained in line; whereas, where the pulleys are on separate shafts there is a constant tendency to destroy the alignment and wear the boxes unequally.

Fourth. All hammers having side latch to suspend the ram receive a very decided shock or side wrench as the ram passes up above the latch a few inches and then drops back upon it. We suspend the ram by central clamps, directly under the rolls and directly above the ram. These clamps have broad surfaces and are pivoted so as to follow the board downward before engaging, and the shock of suspension is thus cushioned and always remains a direct vertical pull, without lateral strain.

Fifth. Our eccentrics are both keyed on the same shaft, and thus held rigidly in line.

Sixth. Large wearing surfaces of the front roll. Shaft and eccentrics do not revolve; simply have a slight oscillatory movement.

In general, will say that the details throughout are carefully worked out, and there is ample provision for adjusting the guides for wear and for the alignment of dies necessary for fine drop forging. The ram and shoe, or die holder, in the anvil are made regularly of steel, unless otherwise specified.

SPECIFICATIONS.

No.	Weight.	Weight of Ram.	Distance Between Guides.	Height of uprights.	Size of Pulley.
2.....	7,500 lbs.	200 lbs.	11"	66"	18" x 4"
4.....	12,000 lbs.	400 lbs.	14"	84"	24" x 8"
6.....	17,000 lbs.	600 lbs.	16"	96"	28" x 8"
8.....	21,000 lbs.	800 lbs.	16"	96"	32" x 8"
10.....	24,000 lbs.	1,000 lbs.	16"	96"	32" x 10"
12.....	27,500 lbs.	1,200 lbs.	16"	96"	36" x 8"
15.....	32,000 lbs.	1,500 lbs.	16"	96"	36" x 8"
18.....	39,000 lbs.	1,800 lbs.	16"	96"	38" x 8"
20.....	42,000 lbs.	2,000 lbs.	18"	96"	40" x 10"

T. H. B. I. T. E. B. A. N. S. C. O. M. P. A. N. Y.

FORGES.

DESCRIPTION FIG. 11768.

The No. 1 forge is especially adapted for heavy blacksmith work. It has a very large and deep fire place and powerful blast, and is capable of doing the heaviest kind of work.

It will bring a bar of 3" round iron to a welding heat in five to six minutes; 4" iron in ten minutes; and heavier work, if required, in the same proportion of time.

It is far superior to the old fashioned bellows and brick forge. It does not require half the room, can be got at from all sides, and can be placed in the most convenient position, regardless of the position of the chimney.

This forge has the patent drop doors and revolving ball tuyere, and with it we give our improved iron stand—a very convenient article, and found in no other forge.

This stand is adjustable as to height, and can be placed any required distance from the forge, supporting a bar of iron any length. Please contrast these features with other makes.

SPECIFICATIONS.

Height, to top of hearth.....	30"
Hearth.....	40" x 28"
Fan, diameter.....	14"
Weight.....	270 lbs.
Hood is made of No. 20 steel, braced inside by two braces of bar iron. This makes the stiffest hood ever put on any forge.	

Power attachment and water tank are furnished at extra cost when desired.

FAIRBANKS NO. 1 SCIENTIFIC BLACKSMITH'S FORGE.



FIG. 11768.

NO. 2A SCIENTIFIC PORTABLE FORGE.



FIG. 11769.

DESCRIPTION FIG. 11769.

The 2A forge will make a welding heat on 2½" iron (round) in five to eight minutes.

It is a favorite size and style for machine shops, tool works, plumbers, locksmiths, planters and railroad repair shops. The cut shows the detachable lever used on all of our forges, as it appears when removed from its bearing and stood up out of the way. To take it out and replace it, it is only necessary to bring the end of the lever down until it is about level, when it can be rolled out of or into the socket.

No other forge made can detach the lever. No dead centers; always ready to start.

SPECIFICATIONS.

Height, to top of bowl.....	29"
Hearth.....	27" x 21"
Fan, diameter.....	10"
Weight.....	150 lbs.

Power attachment furnished at extra cost.

FORGES.

NO. 7A SCIENTIFIC PORTABLE FORGE.



FIG. 11770.

DESCRIPTION FIG. 11770.

The 7A forge has our double ratchet, solid frame, adjustable legs, detachable lever, and other special features.

It has a coal box in one end.

This forge will produce welding heat on 2½" iron in from five to eight minutes, and will do heavier work when required.

This style is very popular on account of the shape of bowl (or fireplace) and the convenience of coal box, which is a part of bowl. This forge is appreciated by practical men.

SPECIFICATIONS.

Height, to top of bowl.....	29"
Bowl.....	30" x 20"
Coal box, depth.....	5½"
Fan, diameter.....	10"
Weight.....	165 lbs.

DESCRIPTION FIG. 11771.

Our 7B forge differs from our 7A only in having a shield or dash instead of a hood. It is practically of same weight, will do the same work, and is adapted to the same class of users.

SPECIFICATIONS.

Height, to top of bowl or fireplace.....	29"
Bowl.....	30" x 20"
Coal box, depth.....	5½"
Fan, diameter.....	10"
Weight.....	165 lbs.

NO. 7B SCIENTIFIC PORTABLE FORGE.



FIG. 11771.

FORGES.

NO. 10B SCIENTIFIC RAILROAD AND BRIDGE BUILDERS' FORGE.



FIG. 11772.

STYLE O1 FORGE.



FIG. 11776.

DESCRIPTION FIG. 11772.

This forge is arranged so that both the shield and lever can be removed entirely and placed on the inside, thus obviating danger of breakage in transportation. The door on side gives ample room to oil and clean the working parts.

Height, to top of bowl.....	31"
Diameter, outside measure.....	18"
Fan, diameter.....	8"
Weight.....	about 100 lbs.

DESCRIPTION FIG. 11773.

Style H is particularly designed for manual training and similar schools. The base of H 1 is open for receipt of hod to catch refuse from dumping tuyeres. H 2 is the same as H 1, except that there are four legs. H 3, of steel plate, has individual draws with padlocks, one for each pupil. Upon each tank is a tool hanger.

No. of Forges.	Height of Forge.	Size of Pan.	Weight.
H 1 and 2....	29"	26" x 30"	300 lbs.
H 1 dble....	29"	26" x 30"	550 lbs.
H 3.....	29"	26" x 30"	400 lbs.

Down draft hood for style H, extra.

STYLE H1 FORGE.



FIG. 11773.

STYLE J1 FORGE.



FIG. 11774.

DESCRIPTION FIG. 11774.

Style J is designed for the handling of medium and heavy work. Built in three sizes, it is especially adaptable to general smithshop equipment. The exceptionally heavy fire pan is provided with insulated fire plate and fitted with type D tuyeres, as described below, Fig. 11775. In all three sizes the coal pan is cast as a part of the forge, but with independent water tank, except in the case of the J 2 style, in which both coal and water compartments form a part of the main fire pan. Either up or down draft can be provided for all three sizes. In the down draft hood an interior plate forms with the back plate a space which, under the action of the exhaust fan, serves as a passage for smoke and gases caught at the top edge of the hood. By means of the handle and gear, adjustment to any angle is a simple matter.

No. of Forges.	Height of Forge.	Size of Pan.	Weight not Packed.
J 0.....	28 1/4"	29" x 34"	325 lbs.
J 1.....	28 1/4"	39" x 49"	450 lbs.
J 2.....	26"	48" x 60"	750 lbs.

DESCRIPTION FIG. 11775.

Style O, designed for the heaviest work, is built in four sizes, all of which are of steel plate, having angle iron base and top, which insures rigidity. The coal pan is deep. The tuyeres are of a special free air type which insures quick heat. Either down draft hood or the up draft type can be furnished. The ventilating hood is of the up draft type.

Style O 4 is made with a special tuyere arranged in three parts, each having a separate blast connection. It is thus adapted for plate and other heavy work, for the tuyere permits making the fire the whole length of the forge, 52".

SPECIFICATIONS FIG. 11775.

No. of Forges.	Height of Pan.	Size of Pan.	Weight not Packed.
O 1.....	25"	42" x 42"	800 lbs.
O 2.....	25"	54" x 54"	1,300 lbs.
O 3.....	25"	72" x 72"	2,000 lbs.
O 4.....	25"	52" x 52"	1,000 lbs.

DESCRIPTION FIGS. 11776 TO 11778.

The nest tuyere, A 1, is 6" square by 6 1/2" high. Air is delivered to fire through a slot measuring 3/4" x 1 3/4".

The adjustable tuyere, B 1, is provided with a rod ending in a tapering key, which regulates the width of opening for discharge of air to the fire. The tuyere flange is 10" diameter.

The oil-burning tuyere, C 1, 19" diameter by 12" deep, is a cast iron pot designed to be supported beneath the forge, and lined with fire clay and brick.

The dumping tuyere, D, is built in four sizes, D 1, D 2, D 3, and D 4, applicable for light, medium, heavy, and very heavy work.

NO. B1 TUYERE.

No. of Tuyere.

Weight.

NO. A1 TUYERE.



FIG. 11776.



FIG. 11777.

A 1.....	23 lbs.
B 1.....	38 lbs.
C 1.....	130 lbs.
D 1.....	24 lbs.
D 2 and 3.....	38 lbs.
D 4.....	62 lbs.

NO. D1 TUYERE.

NO. D1 TUYERE.

ELASTIC ROTARY BLOW RIVETING MACHINES.

STANDARD MACHINE, STYLE A.



FIG. 11769.

DESCRIPTION FIGS. 11768 AND 11769.

The riveting machines here illustrated represent the results of long experience in the feasibility and durability of the elastic rotary blow type of riveter.

One important feature over the old type of machine is the direct and central application of power to the oscillating cylinder containing the hammer rod and compression springs.

This feature allows of an increase of from 20 to 35 per cent in the speed of the various machines, which increases the number of blows per minute, and therefore the time required for heading a rivet is reduced, resulting in an increased output of the machine.

Another feature which improves the quality of work done on this machine is the positive rotary motion given to the hammer rod through the medium of worm and gear. The action of the riveting hammer when revolved by this method is to create a regularly applied "breaking-down" action, which causes the rivet to spread evenly on all sides, thereby forming an even shaped head on the rivet.

These riveters are built in sizes to head rivets from $\frac{1}{8}$ " to $\frac{3}{4}$ " in diameter. The face of the machine against which the table bracket is bolted is faced and grooved to receive a tongue on the table bracket. This construction, therefore, will admit of the use of a horizontal or vertical table. In many cases it is an advantage to have the machine equipped with both tables, thus permitting of handling a larger variety of work.

The machine is also furnished with a lower revolving fixture which is secured to the circular table when both heads of a rivet are to be formed simultaneously.

STANDARD MACHINE, STYLE B.



FIG. 11769.

SPECIFICATIONS.

Size of Machine.	Floor Space.	Total Height.	Depth of Throat.	Hammer to Face of Machine.	Floor to Hammer in Lowest Position.	Table in Lowest Position to Hammer in Lowest Position.	Weight
$\frac{1}{8}$ "	12" x 18"	59 $\frac{1}{2}$ "	5"	4"	35 $\frac{1}{4}$ "	25"	185 lbs.
$\frac{1}{4}$ "	15" x 22"	66"	7"	5 $\frac{3}{4}$ "	37 $\frac{1}{2}$ "	25"	405 lbs.
$\frac{3}{8}$ "	16" x 25 $\frac{1}{2}$ "	73 $\frac{1}{2}$ "	8 $\frac{3}{4}$ "	7 $\frac{1}{2}$ "	40 $\frac{1}{2}$ "	31 $\frac{1}{2}$ "	594 lbs.
$\frac{1}{2}$ "	20" x 28"	74"	10"	8 $\frac{1}{4}$ "	40"	25 $\frac{1}{4}$ "	762 lbs.
$\frac{5}{8}$ "	24" x 32"	80"	11 $\frac{1}{2}$ "	9"	37 $\frac{1}{2}$ "	19 $\frac{1}{2}$ "	932 lbs.
$\frac{3}{4}$ "	20" x 34"	89"	12"	9"	42"	28 $\frac{1}{4}$ "	1,194 lbs.
$\frac{7}{8}$ "	35" x 43"	99 $\frac{1}{2}$ "	13 $\frac{1}{2}$ "	10 $\frac{1}{2}$ "	39 $\frac{1}{4}$ "	22 $\frac{3}{4}$ "	2,428 lbs.

Countershaft, shown on following page, is furnished at additional cost only.

ELASTIC ROTARY BLOW RIVETING MACHINES.

DESCRIPTION FIG. 11790.

COUNTERSHAFT FOR RIVETERS.



FIG. 11790.

Just the thing for small riveting

This rotating vibratory riveter is a light bench model that will speed up your production on small riveting up to $\frac{1}{8}$ in. diameter. Easily operated by an apprentice or the most inexperienced female labor.



GRANT

Riveters

are manufactured in many styles. There are Noiseless Spinning Riveters, Multiple Spindle Riveters, Pneumatic Riveters, and many other designs. Complete details are outlined in booklet. Send for your copy today.

The Grant Mfg. & Machine Co.
85 Silliman Avenue
Bridgeport, Conn.

MERS.
RIVETER.



11792.

making a very neat head without through wood, and similar classes but most of our customers make steel.

sizes from $\frac{1}{8}$ " up to $\frac{1}{2}$ ". No. 4

No. 4 for about $\frac{1}{2}$ " or $\frac{3}{8}$ ".
of course it was slow.
I'd be glad to furnish fur-
as to construction.

THE HIGH SPEED RIVETING HAMMER

(Patd.)

Cold Riveting
1/64 in. to 1 1/2 in. in
diameter

Write for C-
Send

THE I
HAMN
110
Rochester



FORGES.

NO. 1 GAS FORGE (BENCH).



FIG. 11700.

DESCRIPTION FIG. 11700.

Bench space, 6" x 6".
Weight, packed, about 30 lbs.
Measure, packed, 15" x 11" x 11".

DESCRIPTION FIG. 11701.

Bench space, 9" x 12".
Weight, packed, about 85 lbs.
Measure, packed, 17" x 17" x 12".

NO. 1 TOOL ROOM GAS FORGE.



FIG. 11702.

DESCRIPTION FIG. 11702.

Entrance, 3" wide, 2" high.
Depth of heating space, 4".
Floor space, 24" x 20".
Weight, net, about 210 lbs.
Weight, packed, about 275 lbs.
Measure, packed, 58" x 26" x 24".
Gas consumption, per hour, about 60 cubic feet.

DESCRIPTION FIG. 11703.

Weight, packed, about 400 lbs.
Measure, packed, 62" x 26" x 24".
Gas consumption, per hour, about 100 cubic feet.

DESCRIPTION FIG. 11704.

NO. 3.

Heating space, 8" wide, 10" deep.
Entrance, 8" x 3".
Floor space, 30" x 26".
Weight, net, about 490 lbs.
Weight, packed, about 585 lbs.
Measure, packed, 52" x 32" x 26".
Gas consumption, per hour, about 100 cubic feet.

NO. 5:

Heating space, 11" wide, 14" deep.
Entrance, 11" wide, 3 or 3 1/2" high.
Floor space, 36" x 26".
Weight, net, about 700 lbs.
Weight, packed, about 800 lbs.
Measure, packed, 52" x 38" x 29".
Gas connection is made to union G.
Blast connection below air cock A.
Gas consumption, per hour, about 120 cubic feet.

NO. 3 AND NO. 5 GAS FORGES.



FIG. 11704.

NO. 2 GAS FORGE (BENCH).



FIG. 11701.

NO. 2 TOOL ROOM GAS FORGE.



FIG. 11703.

FORGES.

DESCRIPTION FIG. 11765.

Entrance, $12'' \times 1\frac{1}{2}''$, depth, 4".
Floor space, $18'' \times 23''$.
Weight, net, about 285 lbs.
Weight, packed, about 375 lbs.

Measure, packed, $42'' \times 27'' \times 24''$.
Gas connects at G by $\frac{1}{2}''$ pipe.
Blast connects at C by 1" pipe.
Gas consumption, per hour, about 90 cubic feet.

NO. 7 GAS FORGE.



FIG. 11765.

DESCRIPTION FIG. 11766.

Entrance, $3\frac{1}{2}'' \times 3\frac{1}{2}'' \times 3\frac{1}{2}''$ deep.
Slot under burner H, $9\frac{1}{2}'' \times 1\frac{1}{4}''$.
Floor space, $24'' \times 24''$.
Height to entrance, 40".
Height to top, 52".

Weight, net, about 1,200 lbs.
Weight, packed, about 1,400 lbs.
Measure, crated, $27'' \times 27'' \times 55''$.
Gas consumption, per hour, about 200 cubic feet.

DESCRIPTION FIG. 11767.

Front entrance, 9" wide, 3" high.
Capacity, about 40 lbs. per charge, heating at rate of three $\frac{3}{4}''$ rivets per minute.
Smaller size proportionately quicker.

NO. 9 GAS FORGE.



FIG. 11766.

Floor space, $25'' \times 26''$.
Weight, net, about 413 lbs.
Weight, packed for shipment, about 514 lbs.
Measure, packed, $52'' \times 28'' \times 27''$.
Gas consumption, per hour, about 120 to 200 cubic feet.

This furnace will heat rivets of any thickness up to $\frac{3}{4}''$, and not exceeding 3" in length. About 40 lbs. are fed into the furnace in bulk and it will discharge three $\frac{3}{4}''$ rivets per minute, or smaller rivets in proportionately less time. It takes 15 minutes to heat up the furnace, at the expiration of which time the first rivet can be withdrawn.

The heater is made for any kind of gas in ordinary use, including natural gas, but the kind of gas to be used must be specified in the order, so that the burner may be adapted to it.

The air supply connects at A P and must be under the pressure of 1 lb. to the square inch. The gas connects at G P and the pressure may be anything above 1 oz., the supply being abundant. The rivets are fed through the feed hole H under the cover K. The furnace should be kept well filled and as the heated rivets are discharged new rivets should replace them so that the furnace never contains less than two-thirds of a full charge.

The bottom slab F is an inclined plane connecting with the horizontal slab C about 6" from the front of the furnace. On the slab C the actual heating is performed, while the rivets, packed into the furnace and resting on the inclined plane, are pre-heated by the waste heat, which passes through the charge to a vent at the feed hole.

The burner B emits numerous small flames downward upon the work, and as the heated rivets are removed from the slab C those back of them slide down the incline and take their place. The rapidity of heating can be controlled, as also the temperature of the rivets, which can be brought up to a bright cherry red or nearly white heat. The rivets are uniformly heated and over heating is effectually prevented by proper adjustment of the gas and air valves.

The angle plug D may be removed, if necessary, but is intended to confine the heat to the furnace as much as possible without interfering with the removal of the heated rivets. This will save the gas, by forcing the products of combustion to escape through the feed hole instead of the wide open front entrance, thus pre-heating the rivets on the inclined slab before they reach the actual heating space immediately below the burner.

We make these furnaces to order for larger sizes and quantities of rivets, the order stating the required output per hour.

Air supply under pressure of one pound to the square inch is indispensable, and our No. 1 pressure blower will supply two furnaces.

NO. 2 GAS RIVET HEATER.



FIG. 11767.

ELASTIC ROTARY BLOW RIVETING MACHINES.

STANDARD MACHINE, STYLE A.



FIG. 11708.

DESCRIPTION FIGS. 11708 AND 11709.

The riveting machines here illustrated represent the results of long experience in the fragility and durability of the elastic rotary blow type of riveter.

One important feature over the old type of machine is the direct and central application of power to the oscillating cylinder containing the hammer rod and compression springs.

This feature allows of an increase of from 20 to 35 per cent in the speed of the various machines, which increases the number of blows per minute, and therefore the time required for heading a rivet is reduced, resulting in an increased output of the machine.

Another feature which improves the quality of work done on this machine is the positive rotary motion given to the hammer rod through the medium of worm and gear. The action of the riveting hammer when revolved by this method is to create a regularly applied "breaking-down" action, which causes the rivet to spread evenly on all sides, thereby forming an even shaped head on the rivet.

These riveters are built in sizes to head rivets from $\frac{1}{8}$ " to $\frac{3}{4}$ " in diameter. The face of the machine against which the table bracket is bolted is faced and grooved to receive a tongue on the table bracket. This construction, therefore, will admit of the use of a horizontal or vertical table. In many cases it is an advantage to have the machine equipped with both tables, thus permitting of handling a larger variety of work.

The machine is also furnished with a lower revolving fixture which is secured to the circular table when both heads of a rivet are to be formed simultaneously.

STANDARD MACHINE, STYLE B.



FIG. 11709.

SPECIFICATIONS.

Size of Machine.	Floor Space.	Total Height.	Depth of Throat.	Hammer to Face of Machine.	Floor to Hammer in Lowest Position.	Table in Lowest Position to Hammer in Lowest Position.	Weight
$\frac{1}{8}$ "	12" x 18"	59½"	5"	4"	35¼"	25"	185 lbs.
$\frac{1}{4}$ "	15" x 22"	66"	7"	5¼"	37½"	25"	405 lbs.
$\frac{3}{8}$ "	16" x 25½"	73½"	8¾"	7½"	40½"	31½"	594 lbs.
$\frac{1}{2}$ "	20" x 28"	74"	10"	8¾"	40"	25¼"	762 lbs.
$\frac{5}{8}$ "	24" x 32"	80"	11½"	9"	37½"	19½"	932 lbs.
$\frac{3}{4}$ "	20" x 34"	89"	12"	9"	42"	28¼"	1,194 lbs.
$\frac{3}{4}$ "	35" x 43"	99½"	13½"	10½"	39¼"	22¼"	2,428 lbs.

Countershaft, shown on following page, is furnished at additional cost only.

ELASTIC ROTARY BLOW RIVETING MACHINES.

DESCRIPTION FIG. 11790.

Size.	Blows per Minute.	Countershaft.			Speed
		Machine Driver.	T and L Pulleys.		
$\frac{1}{8}$ "	1,550	22" x 3"	6" x 3"	425	
$\frac{3}{16}$ "	1,325	24" x 3"	6" x 3"	396	
$\frac{1}{4}$ "	1,270	22" x 3"	6" x 3"	460	
$\frac{5}{16}$ "	1,070	22" x 3"	6" x 3"	390	
$\frac{3}{8}$ "	975	20" x 4"	8" x 3"	440	
$\frac{1}{2}$ "	1,000	22" x 4"	10" x 3"	455	
$\frac{5}{8}$ "	750	26" x 4"	8" x 4"	350	

COUNTERSHAFT FOR RIVETERS.



FIG. 11790.

QUICK STROKE ROTARY RIVETING HAMMERS.

NO. 3 RIVETER.



FIG. 11791.

SHOWS SPECIAL PROJECTING NOSE.

NO. 5 RIVETER.



FIG. 11792.

DESCRIPTION FIGS. 11791 AND 11792.

These machines strike an extremely rapid blow and their action is such as to bend around the head, making a very neat head without upsetting or bending the body of the rivet. They are therefore especially suitable for hinges, riveting through wood, and similar classes of work. The machine is regularly furnished with flat table, as shown in Fig. 11792, for the reason that most of our customers make their own special chucks or dies to suit their work, but we can make lower dies or chucks as may be desired.

We furnish these in five sizes: No. 1 rivets $\frac{1}{8}$ " up to $\frac{3}{4}$ ". No. 2 rivets from $\frac{1}{4}$ " up to $\frac{3}{8}$ ". No. 3 rivets from $\frac{3}{16}$ " up to $\frac{3}{8}$ ". No. 4 rivets from $\frac{1}{2}$ " up to $\frac{5}{8}$ ". No. 5 rivets from $\frac{1}{2}$ " up to $\frac{3}{4}$ "; it works $\frac{3}{4}$ " round very rapidly.

In general we may say the No. 1 is best adapted for about $\frac{3}{8}$ ", No. 2 for about $\frac{5}{8}$ ", No. 3 for about $\frac{3}{8}$ ", No. 4 for about $\frac{1}{2}$ " or $\frac{5}{8}$ ", and No. 5 for $\frac{3}{8}$ " and $\frac{3}{4}$ " round. We have known the No. 5 to be used for riveting even as large as $1\frac{1}{2}$ ", but of course it was slow.

We furnish these with rubber springs, which we consider much superior to the steel or bronze. We would be glad to furnish further details to our customers upon application, as to the adaptability of these machines to special work and as to construction.

FILING MACHINES.

DESCRIPTION FIG. 11793.

This is a machine for doing all sorts of filing—more especially the particular kind—accurately and rapidly in a much more satisfactory way than by the old, slow, weary way of our grandfathers.

It does best the kinds of work that are best worth doing, and that have always called for the most skillful hand filing, the making of blanking, trimming and coining dies, light dotting, gauges, templates and models.

In addition it can be and is used to advantage in the finishing of parts of guns, typewriters, sewing-machines, gas fixtures, electrical fittings, jewelry, dental and surgical instruments, novelties, clock parts, cutlery, silverware, etc. It is just right for trimming sprues and gates for metal castings; in fact wherever hand filing is now in use the machine will do the work as well or better at a lower cost. It is not limited to filing dies.

The machine is divided by the work bench into two parts—the driving mechanism below and entirely out of the way—the upper division above, in the handiest possible position, leaving the bench free from belts or countershafts.

The table occupies a bench space nine inches in diameter, has a rotary adjustment so that file can be adjusted in any relation to change of light; and can be completely detached from the bench without disturbing the driving mechanism.

The driving mechanism drives the file rapidly in a vertical position and has a rapid return motion; in fact it exactly imitates the motions of hand filing, only the stroke is more regular and uniform.

The file works through an opening in the center of a tilting table which supports the work at the proper angle for filing. The center of the file opening is in line at all positions of the table with the longitudinal center of the file-ram.

BENCH FILING MACHINE.



FIG. 11793.

The tilting table gives you any angle, and it is graduated so that you know just what angle you are getting—it tilts four ways.

You can use any kind of a file—any length and shape of shank—round, square or tapered. You can use a needle file in close quarters and at the speed best adapted to the work. The proper speed for this machine for iron or steel is 200 strokes per minute; for brass or other soft metals, 500 strokes; in fact it must be run at the stated speeds to produce the results we claim for it.

Each machine is furnished complete with countershaft, belt-shifter, hack saw attachment, file guide and work hold-down, and the first cost is practically the whole cost.

Stroke, 0° to 4°.

Table, 9° in diameter.

Tilt of table, 30° to front and back.

Tilt of table, 10° to right and left.

Bench space, 9° in diameter.

Speed of countershaft, 300 revolutions.

DESCRIPTION FIG. 11794.

The ways are placed at the back of the machine away from the dirt and filings, which leaves the space under the table entirely free for handling the files.

The slide has its bearing in the frame of the machine and is fitted with a taper gib.

The crank pin bearing is extra large and is fitted with a bronze bushing.

They are so made that after putting in the file they may be placed in the machine and adjusted so that the file will run true.

The table has an adjustment of 45° to the front and 10° back.

The file holders are arranged to take any shape file up to about 6" long.

BENCH FILING MACHINE.



FIG. 11794.

FILING MACHINES.

DESCRIPTION FIG. 11794.—Continued.

When it is necessary to change to a different shape of file this holder may be detached with the file in place and another file and holder substituted.

After the files required for a certain job have been adjusted in their separate holders, the changes from one style to another may be made very rapidly.

We furnish a set of six holders, two of each of the styles shown. Additional holders may be ordered.

Height to top of table.....	11"	Face of pulleys.....	1 1/4"
Diameter of table.....	8"	Stroke.....	3/4" and 1 1/2"
Diameter of pulleys.....	6"	Weight.....	45 lbs.

DESCRIPTION FIG. 11795.

The machine is made and finished in a first class manner and is a high grade machine throughout. The ways and slide are fitted with taper gib and are carefully scraped to a bearing, the crank shaft and important bearings are hardened and ground and are protected from dust and dirt. The bearing for the crankshaft has a cast iron bushing and the crank pin has an adjustable bronze bushing. Cone pulleys provide for four changes of speed.

The ways are placed at the back of the machine away from the chips and filings, directly back of and in line with the file, making the stiffest construction possible with the weight.

The table is adjustable about two axes at right angles to each other, tilting to an angle of 45°, and work may be filed at any angle. The space under the table is left clear to facilitate the changing of files.

A screw feed, operated by hand, is provided by which the work may be fed to the file.

An adjustable finger holds the work firmly to the table without marring and allows it to be moved freely in any direction on the table.

An air pump blows away the chips and filings and keeps the work and file clear, insuring a smooth cut.

The stroke of the file is adjustable from 4" to 0". The file is arranged to clear on the return stroke either on the up or down stroke as desired, and may be made to cut either on the up or down stroke by changing the crank pin to the opposite end of the crank arm. The amount of clearance is adjustable from 1/8" to 0" by means of the knurled headed screw at the back of the machine.

The file arms are attached to the slide, two of them carry the file holders and the file may be clamped either above or below the table, or at both ends. Either of these arms may be detached and the file supported at the free end by means of the special arm furnished, which carries an adjustable finger to support the file at the back.

The file and holder may be removed very quickly without disturbing the adjustment when it is necessary to examine the work or to change from one style of file to another.

NO. 2 FILING MACHINE.

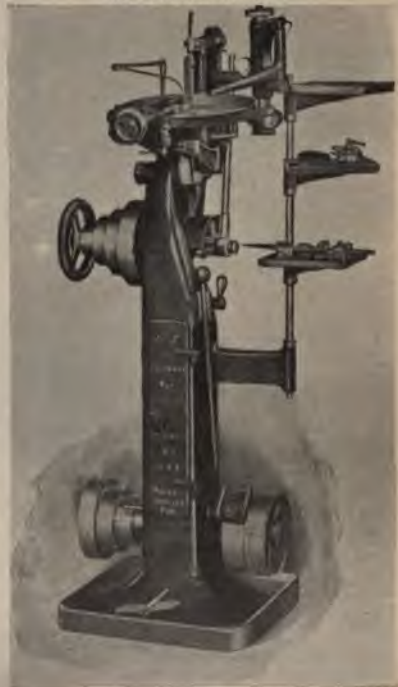


FIG. 11795.

FILING MACHINES.

DESCRIPTION FIG. 11795.—Continued.

A pair of arms for holding hack saw blades is also furnished, which may be attached to the slide in place of the file arms.

File Holders.—We have two systems of holding files, one by using adjustable holders and the other by using rigid holders. The adjustable holder consists of three parts. It clamps the file, allowing it to be adjusted in the machine to run true. After adjusting, it may be locked in position and removed and replaced at will without disturbing the adjustment.

The adjustable holder is made in three styles, No. 1, 2 and 3, each of which is made in two sizes, (small) A and (large) B. The No. 1 with wood handle for small files, No. 2 for round, square and irregular shaped files, and No. 3 for pillar and rectangular files.

The rigid holder takes round shank files. We furnish a convenient jig for babbitting round shanks to ordinary files. The rigid holder is made in three sizes for shanks, $\frac{1}{2}$ ", $\frac{3}{8}$ ", and $\frac{1}{4}$ ".

Both the rigid and adjustable holders have a V way, which is clamped to a corresponding V on the file arm, admitting of very quick changes.

The regular equipment as furnished with the machine includes:

1 countershaft attached to base.	1 babbitting jig.
2 file holder arms (top and bottom).	9 file holders:
1 file holder support arm.	1 each A1, A2, A3, adjustable.
2 hack saw arms.	1 each B1, B2, B3, adjustable.
3 file support rods with plate.	1 each $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", rigid.

SPECIFICATIONS.

Height of table from floor.....	4'
Diameter of table.....	12"
Tilt of table, 45° to the front, 30° to the right, 5° to the back and left.....	
Stroke, adjustable.....	4" to 0"
Diameter of drive pulley.....	8"
Face of drive pulley.....	2"
Weight, net.....	330 lbs.
Weight, boxed.....	450 lbs.
Speed of countershaft, revolutions per minute.....	160

CENTERING MACHINES.

NO. 1 SINGLE SPINDLE BENCH CENTERING MACHINE.

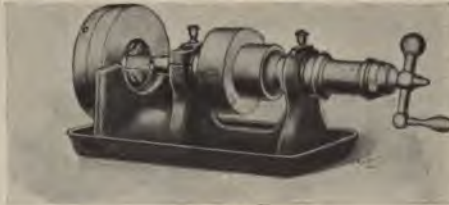


FIG. 11796.

DESCRIPTION FIG. 11796.

The No. 1 machine will center round bars from $\frac{1}{4}$ " to 3" in diameter. The centering chuck of this machine is permanently attached to the frame at a fixed distance from the spindle.

The machine is furnished in two styles, as follows:

Style A. Machine complete on iron table, with countershaft, special drill chuck for combination center drills and half dozen drills for same.

Style B. Same as A, but without stand, as shown in cut.

Note.—Machine is furnished with three jaw chuck for holding round and hexagon stock, but if a four jaw chuck is desired it can be supplied in addition or instead of the regular chuck. Countershaft may be omitted if not required.

SPECIFICATIONS.

	Floor Space.	Weight.	Box Meas.	Revol
Style A.....	25" x 32"	350 lbs.	18" x 22" x 40"	400
Style B.....	10" x 27"	150 lbs.	12" x 12" x 30"	400

CENTERING MACHINES.

DESCRIPTION FIG. 11797.

The No. 2 machine will center round bars from $1\frac{1}{4}$ " to $4\frac{1}{4}$ " diameter. The centering chuck is mounted to slide on the bed and may be adjusted with reference to the drilling spindle. This permits the use of various special tools in the spindle, and some irregular pieces may be conveniently held in this machine for special drilling or end operations.

Each machine is regularly furnished with a three jaw chuck for holding round and hexagonal work, but a four jaw chuck can be supplied in addition to or in place of the regular chuck, if desired.

Built in two styles:

Style A machine, complete on table, with countershaft, special drill chuck for combination center drills, and half dozen drills for same.

Style B. Same as Style A, but without stand, so as to use as a bench machine.

	Style A.	Style B.
Space required.....	25" x 32"	11" x 32"
Weight.....	400 lbs.	225 lbs.
Box measurements.....	18"x27"x40"	13"x15"x21"

The countershaft has tight and loose pulleys 6" diameter for 2" belt, and should make about 400 revolutions per minute.

Countershaft may be omitted if not required.

NO. 2 SINGLE SPINDLE CENTERING MACHINE ON STAND.



FIG. 11797.

DESCRIPTION FIG. 11798.

The No. 3 machine will center round bars from $1\frac{1}{4}$ " to $5\frac{1}{4}$ " diameter. The centering chuck of this machine slides on the ways and may be clamped at any desired point, like the No. 2 machine.

The machine may be readily modified for special requirements. An additional jig plate or angle with guide bushings to support long tools or standard drills is frequently furnished; a special rest or work holder fitted in place of, or to exchange with, the regular centering chuck, is often advantageous. These changes sometimes provide convenient facilities for special work, at low first cost as compared with other machines for such purposes.

Each machine is furnished with a three jaw centering chuck for round and hexagonal stock, countershaft, special drill chuck for combination center drills, and half dozen drills for same.

A four jaw chuck can be supplied, if desired.

Floor space required.....	24" x 55"
Weight.....	500 lbs.
Box measurement.....	18" x 53"

Th-
5" in
abou

NO. 3 SINGLE SPINDLE CENTERING MACHINE.



FIG 11798.

CENTERING MACHINES.

NO. 4 SINGLE SPINDLE CENTERING MACHINE.



FIG. 11799.

DESCRIPTION FIG. 11799.

The No. 4 machine will center round bars from $\frac{1}{2}$ " to $7\frac{1}{2}$ " diameter. The centering chuck of this machine slides on the ways, and may be clamped at any point, to permit the use of various special tools in the spindle if required for special drilling or end operations.

A floor stand is furnished to support the end of long bars.

Machine is regularly furnished with three jaw centering chuck for round and hexagonal stock, countershaft, special drill chuck for combination center drills, and half dozen drills for same.

A four jaw centering chuck can be supplied, if desired.

Floor space required...	25" x 59"
Weight.....	600 lbs.
Box measurements,...	26" x 26" x 38"

The countershaft has tight and loose pulleys 6" diameter for 2" belt, and should make about 350 revolutions per minute.

DESCRIPTION FIGS. 11800 TO 11802.

Two spindles are provided, one of which carries a small twist drill and the other a center reamer or countersink. The spindles are driven at different speeds by gears connecting them with the driving pulley which revolves on one of the pivots for the swinging head. The belt tension does not vary, and exerts no strain tending to change the position of the spindles.

Sensitive spindles.—Both spindles are sensitive, being balanced by springs, but these do not bear on revolving parts, thus avoiding wear.

Convenient feed.—Each spindle is advanced to its cut by the one feed lever, which has the same direction of feeding motion for both spindles. The head is swung laterally by the convenient ball handle shown.

Positive stop motion.—Each spindle is provided with a fixed collar inside the head, which limits its advance at the proper point. In connection with the adjustable stop for setting the work, this feature avoids all danger of reaming the work too deep.

Positive locking device.—Neither spindle can be advanced by the feeding lever except when on the center; and whenever either spindle is so advanced the swinging head becomes positively locked against sideways motion and remains so until the spindle has been again returned to the fully withdrawn position. This feature prevents the breakage of drills by any accidental side movement.

4" TWO SPINDLE CENTERING MACHINE.



FIG. 11800.

CENTERING MACHINES.

DESCRIPTION FIGS. 11800 TO 11802.—Continued.

The vise is a carefully made universal scroll chuck with ample wearing surfaces and hardened jaws which may be readily ground true whenever necessary.

Supports for work.—A support is attached to the lower chuck jaw to guide the front end of the bar while same is being inserted in the chuck. The bar to be centered may be conveniently laid upon this support and the Y-shaped rest shown, while being gripped by the chuck, thus avoiding all necessity for the operator to support the weight of the work while chucking same. The angle of the Y rest is such that one turn of the nut will vary the height of the rest sufficiently for bars of $\frac{3}{4}$ " difference in diameter.

Stops for work.—A swinging stop with an adjusting screw is provided, against which the work should be placed before gripping. The screw can be adjusted to permit any required depth of reaming, thus securing perfect uniformity.

Oil supply for the cutting tools is obtained from a conveniently placed oil pot; a drainage pan for the chips and a drip cup to catch the oil are provided. Ample shelf and table room is also provided.

Although these machines are regularly furnished with three jaw centering chucks, four jaw chucks can be supplied in addition to or in place of the regular chucks, if desired.

4" MACHINE.

Equipment: Three jaw centering chuck, countershaft, necessary wrenches, one drill socket, one-half dozen center drills, and four center reamers (60°).

Machine occupies floor space 26" x 54" and weighs about 450 lbs. Countershaft has tight and loose pulleys 6" diameter for 2" belt and should make about 325 revolutions per minute.

5" MACHINE.

Equipment: Three jaw centering chuck, countershaft, necessary wrenches, one dozen center drills, and one-half dozen center reamers (60°).

Shipping weight, in crate.....	1,150 lbs.
Shipping weight, tightly boxed.....	1,215 lbs.
Crate measurements.....	27" x 50" x 76"
Box measurements.....	17" x 28" x 76"
Net weight.....	1,005 lbs.
Capacity to center.....	$\frac{1}{4}$ " to 5"
Floor space required.....	26" x 72"

Countershaft has tight and loose pulleys 10" in diameter for $2\frac{1}{2}$ " belt, and should make about 205 revolutions per minute.

Diameter of machine pulley $8\frac{1}{4}$ " for $2\frac{1}{2}$ " belt, and should make 382 revolutions per minute. This information is given for guidance in cases where it is desired to drive the machine from an independent motor.

9" TWO SPINDLE CENTERING MACHINE.



FIG. 11802.

5" TWO SPINDLE CENTERING MACHINE.



FIG. 11801.

7" MACHINE.

Equipment: Three jaw centering chuck, countershaft, necessary wrenches, three drill sockets, and one center reamer (60°).

Machine occupies floor space 26" x 62" and weighs about 1,000 lbs. Countershaft has tight and loose pulleys, 10" in diameter for $2\frac{1}{2}$ " belt, and should make about 175 revolutions per minute.

9" MACHINE.

Equipment: Three jaw centering chuck, countershaft, necessary wrenches, three drill sockets, one center reamer (60°).

Machine occupies floor space 122" x 26" and weighs about 1,700 lbs. Countershaft has tight and loose pulleys, 10" in diameter, for $2\frac{1}{2}$ " belt, and should make about 175 revolutions per minute.

Note: We can furnish this machine with short bed (5' long) if desired.

CENTERING MACHINES.

REVERSIBLE CENTERING MACHINE, STYLE B.

DESCRIPTION FIG. 11803.



FIG. 11803.

As compared with machines which center both ends of short work at once by the action of opposite spindles, it is to be noted that the pieces are accurately and automatically centered in this machine by a vise which adjusts itself to inequalities of the material, and that the pieces are rapidly and conveniently handled without necessity for moving any portion of the machine.

Convenient means are provided to take up wear and maintain correct alignment, and the machine will give satisfactory service for a long period.

The machine is built in two styles, as follows:

Style A. Machine to be placed on bench, with countershaft, necessary wrenches, one dozen center drills and one-half dozen center reamers (60°).

Style B. Machine complete on column with countershaft, necessary wrenches, one dozen center drills, and one-half dozen center reamers (60°).

Floor stand for machine on column to support long bars, can be supplied at extra cost.

	Style A.	Style B.
Shipping weight, crated.....	275 lbs.	400 lbs.
Shipping weight, boxed.....	12" x 23" x 34"	450 lbs.
Box measurements.....	225 lbs.	18" x 36" x 22"
Net weight.....	1 1/4" to 3 1/2"	350 lbs.
Capacity to center.....	15" x 36"	1 1/2" to 3 1/2"
Space required.....		15" x 36"

Countershaft has light and loose pulleys 6" diameter, for 2" belt, and should make about 325 revolutions per minute.

THE FAIRBANKS COMPANY

CENTERING MACHINES.

DESCRIPTION FIGS. 11804
AND 11805.

The special machines here illustrated is designed to accurately center previously finished shafts 4" in diameter and smaller. The work is held in two centering chucks, one of which revolves and acts as a driver. The shaft is firmly gripped in the revolving chuck, while the end near the tools is supported and revolved in the jaws of the stationary chuck as in a lathe center rest. The centers may then be drilled and reamed to the required depth by the drilling and reaming tools which revolve in a direction opposite to the work and at different speeds. In this way the tools produce centers which exactly correspond with the surface of the stock. It is only in this manner that finished shafting can be centered to run perfectly true. When so centered, such shafts may be turned to receive pistons, pulleys, gears, etc., which may be mounted as accurately as upon fully turned shafts, and a large amount of turning may be dispensed with.

The product of the turret lathe may also be conveniently centered and afterward perfectly finished by grinding.

This new machine has the same spindle mechanism, head stock and three jaw centering chuck used in our regular two spindle centering machine, in which the traverse of the spindles is limited by suitable stops, and which is designed so that neither spindle can be advanced except when on the center. When either spindle is advanced, the head is locked against lateral movement. It also has the secondary revolving chuck which may be clamped anywhere on the bed to accommodate the length of material to be centered. Long shafts may pass through the chucks, and the projecting end may be supported on a floor stand if required.

For ordinary centering of rough stock which is to be turned, the revolving chuck may be swung back out of the way and disconnected by means of a convenient slip pinion. In this position the machine may be used in the common manner.

This special machine has all the advantages of our regular machines, and the revolving attachment in addition, and is an important money saver, because it makes the extended use of commercially finished shafting for machinery parts much more convenient and economical than heretofore.

4" REVOLVING CENTERING MACHINE.



FIG. 11804.

5" REVOLVING CENTERING MACHINE.



FIG. 11805.

Machine is built in two styles, as follows:

Style A. Machine complete with three jaw centering chuck, countershaft, necessary wrenches, one dozen center drills, and one-half dozen center reamers (90°).

Style B. Machine complete, as above, and fitted with additional four jaw centering chuck (to interchange with the regular three jaw chuck) for centering square and octagon stock.

Floor stand, for long bars, furnished at extra cost.

SPECIFICATIONS.

	4" Machine.	5" Machine.
Shipping weight, in crate..	750 lbs.	1,235 lbs.
Shipping weight, tightly boxed.....	800 lbs.	1,300 lbs.
Crate measurements.....	25' x 48' x 62"	27' x 50' x 76"
Box measurements.....	17' x 20' x 64"	17' x 28' x 76"
Net weight.....	700 lbs.	1,150 lbs.
Capacity to center.....	3/4" to 4"	3/4" to 5"
Floor space required.....	24" x 58"	26" x 72"
Countershaft pulleys....	8" x 2 1/2"	10" x 2 1/2"
Speed of countershaft, R. P. M.....	260	295

CUTTING-OFF MACHINES.

2nd STANDARD CONE
DRIVEN CUTTING-OFF
MACHINE.

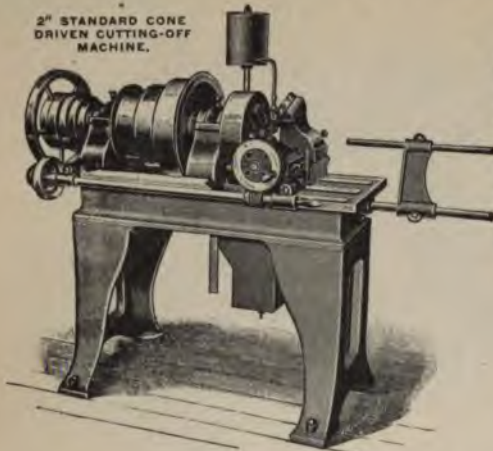


FIG. 11806.

DESCRIPTION FIGS. 11806 TO 11809.

The two tools will cut twice as fast as one, and each tool is a rest for the other. One tool presses up and the other down, which relieves the strain and leverage on chucks and bearings. The same amount of work can be done with less power, and consequently with less strain on tools and machine by grinding one of the tools V shaped to take out the middle of the cut and leaving the other square to take out the corners, just as in planing a slot the work is done much easier by taking a narrow tool first.

The tool blocks are a new pattern in which the blade is set solid in the block at an angle with the line of travel, giving a very strong shearing cut.

TOOL BLOCKS.



FIG. 11807.

As will be seen from the cut, the blades are clamped very strongly in a fixed position and are supported out under the cutting edge.

The blades are nicely ground with good clearance, and cut square every time if only ground square.

Many who have had their temper tried in attempting to set the old style holders to cut square will appreciate these which can be set in but one position.

We manufacture and supply the blades for these blocks and intend to carry all sizes in stock.

The patent nut on back tool block enables the operator to make that tool block independent of the other, and quickly set tools to cut alike, even when machine is running.

The chips and oil are caught in a hinged receptacle under the machine, which drains the oil from the chips; chips can then be dumped dry. This makes a neat, convenient and economical arrangement.

The patent shipper uses two pairs of tight and loose pulleys and ships each belt independently of the other.

This avoids the use of friction clutches and requires no attention except the usual oiling.

The centering attachment runs with a separate belt and countershaft, and makes a perfect centering machine.

It is conveniently arranged and easy to operate.

Boxes take up wear, and spindle is carefully ground to fit. The socket in spindle is made to fit the Morse standard taper No. 1.

One great advantage of centering with this machine is that the work can revolve while centering, which is sure to bring the center true.

Aside from these special features, the machines are made of good material with first class workmanship.

Chucks, tool blocks, and carriages are very solid and stiff, which is of first importance in a cutting-off machine.

All sizes are furnished with automatic feed, automatic throw off, two tools, gauge, and a pedestal rest for long shafts.

For specifications see following page.

3rd STANDARD CONE
DRIVEN CUTTING-OFF
MACHINE.

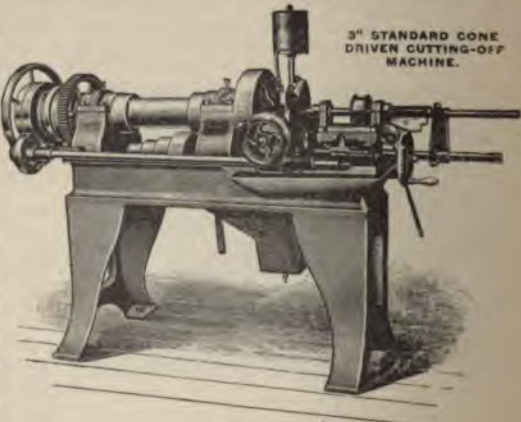


FIG. 11808.

CUTTING-OFF MACHINES.

SPECIFICATIONS FIGS. 11806 TO 11809.

Size.	Counter Shaft T. and L. Pulleys.	Speeds. R. P. M.	Shipping Weight.
2"	3" x 10"	100	800 lbs.
3"	3" x 10"	150 and 220	1,400 lbs.
4"	3" x 12"	100 and 160	1,750 lbs.
5"	3 1/2" x 14"	100 and 180	2,200 lbs.
6"	3 1/2" x 14"	100 and 180	2,900 lbs.

4" 5" AND 6" STANDARD CONE DRIVEN CUTTING-OFF MACHINES.



FIG. 11809.

(For description see preceding page.)

2" ACCELERATED SPEED CUTTING-OFF MACHINE.



FIG. 11810.

wheels are driven by pulleys, one of which is shown in the cut, a corresponding one being at the back of the machine.

The two friction wheels are moved simultaneously by a right and left screw which is connected with the cross screw of the carriage so that as the tools are fed in, the wheels are also fed toward the center of the disks, thus running on a smaller diameter of the disks and driving them at a higher speed. The acceleration thus produced is gradual and regular and the fastest speed is about five times that at starting.

The machine is of a strong, solid build and has proved its superiority in the four years it has been on the market. In many cases it has taken the place of two cone driven machines and has repeatedly proven that it has a much larger capacity than any cone driven machine, even our own two tool machines.

One important feature of this machine is the tool blocks or carriers which are very solid and strong and carry wide blades set in recesses in the side of the blocks and clamped with a cap and bolts.

DESCRIPTION FIGS. 11810 TO 11813.

These machines have a device by which the speed of the main spindle is increased or accelerated as the cutting tools approach the center. This acceleration is produced by a mechanism consisting of two disks, compressing between themselves two movable friction wheels of hard fiber which drive the disks at a speed corresponding to the position of the wheels upon the disks.

Each disk has a geared connection with the main spindle, and the friction

3" ACCELERATED SPEED CUTTING-OFF MACHINE.



11811.

CUTTING-OFF MACHINES.

4" ACCELERATED SPEED CUTTING-OFF MACHINE.

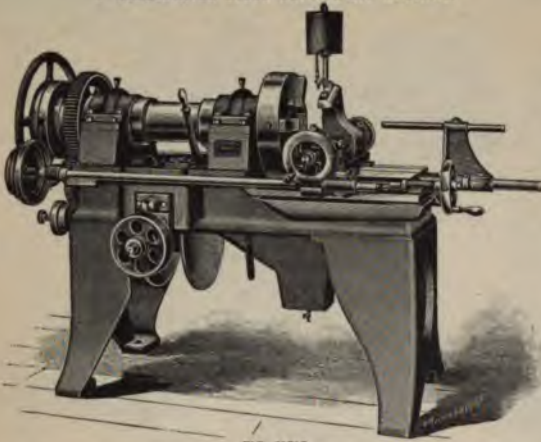


FIG. 11812.

SPECIFICATIONS FIGS. 11810 TO 11813.

Size of Machine.....	2"	3"	4"	5"	6"
Countershaft pulleys.....	10" x 3"	10" x 3"	12" x 3 1/2"	14" x 3 1/2"	14" x 3 1/2"
Speed of countershaft pulleys, revolutions per minute.....	220 and 310	220 and 310	220 and 325	230 and 335	230 and 335
Shipping weight of complete machine.....	1,000 lbs.	1,550 lbs.	1,900 lbs.	2,500 lbs.	3,500 lbs.

6" ACCELERATED SPEED CUTTING-OFF MACHINE.

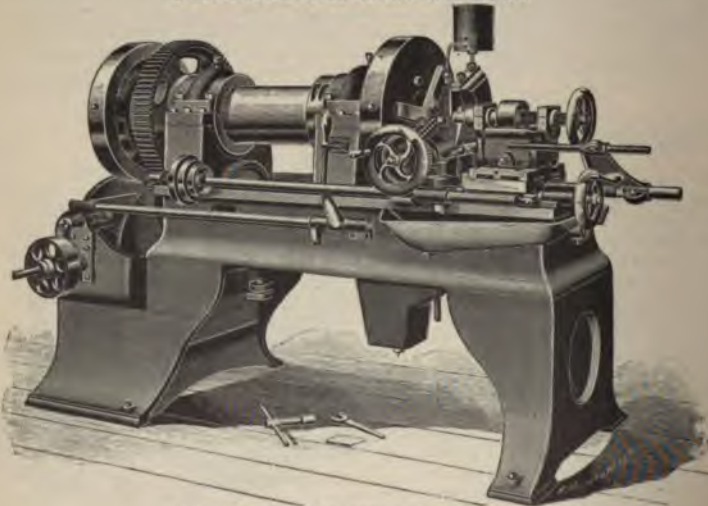


FIG. 11813. SHOWS CENTERING ATTACHMENT.

DESCRIPTION FIGS. 11810 TO 11813.
—Continued.

Each recess forms a guide for setting the blades square and as each blade is supported out under the cutting point and sets at an angle to take a shearing cut, danger of breakage is reduced to a minimum. A special circular on tool blocks will be sent on application.

All sizes are provided with three rates of automatic feed, an automatic stop, patent chip box, countershaft with two speeds, all necessary wrenches, gauges, etc.

The countershafts of these machines set across the machine, but parallel countershafts can be supplied if necessary at slight extra cost.

Any of these machines can be supplied with an attachment for drilling and centering the ends of stock. This is a convenient and accurate machine for this purpose, and will be found very useful when this work is required.

CUTTING-OFF MACHINES.

3" CUTTING-OFF MACHINE.

DESCRIPTION FIG. 11014.

This cut shows our 3" cutting-off machine, with two tools.

The machine is complete, with two powerful chucks, floor stand and countershaft. The countershaft is so arranged that by shifting a lever the speed can be changed while machine is in operation, and allows a faster speed as the cut nears the center. The machine is provided with oil pump and all necessary attachments. The friction pulleys on the countershaft are 12" in diameter with $4\frac{1}{2}$ " face, and one should make 70 and the other 100 turns per minute. Weight of machine is 1,050 lbs.



FIG. 11014.

4 1/2" CUTTING-OFF MACHINE.

DESCRIPTION FIG. 11015.



The cut shows our $4\frac{1}{2}$ " cutting-off machine with single tool and centering attachment, but the machine is furnished with either single tool or with two tools as desired. It is provided with two powerful chucks and oil pump. The driving cone has four changes which, with the two speeds provided with pulleys on the countershaft, gives eight different speeds to the main spindle, varying from 13 to 100 revolutions per minute. The main spindle has bearings $6\frac{1}{2}$ " diameter, 7" long. There is an automatic throw-off, which disengages the feed when the piece is cut off. The countershaft has two pulleys, driven by a simple and efficient clutch, so that by an instantaneous movement of the lever the speed may be accelerated as the tool approaches the center. The driving pulleys on countershaft are 12" diameter by 4" face, and should run 100 and 200 turns per minute, respectively. Width of steps on cones, $3\frac{1}{2}$ ". Adjustable stand for the support of long bars is furnished with each machine. Weight, 1,800 lbs.

CUTTING-OFF MACHINES.

8" CUTTING-OFF MACHINE.

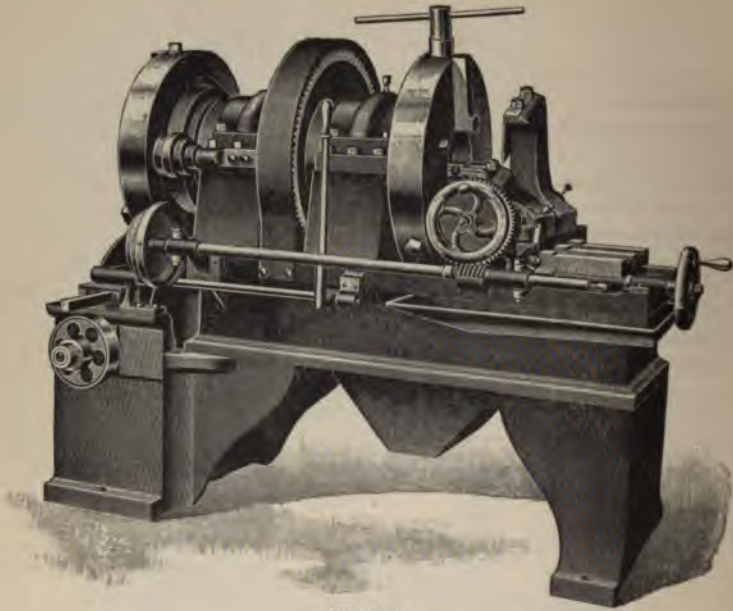


FIG. 11816.

DESCRIPTION FIG. 11816.

This machine will cut unfinished shaft from 2" to 8" diameter.

Clucks are 24" diameter, extra heavy and powerful.

Machine is furnished with oil pump and pans, not shown in the cut.

Has automatic accelerated speed as the tools approach the center.

Countershaft has two speeds with Huribut's patent slapper.

Tight and loose pulleys, 3½" x 14".

Speeds, 275 and 320 revolutions per minute.

Shipping weight, 5,200 lbs.

Can be furnished with a direct current motor attached if desired.

CUTTING-OFF MACHINES.

10" CUTTING-OFF MACHINE.

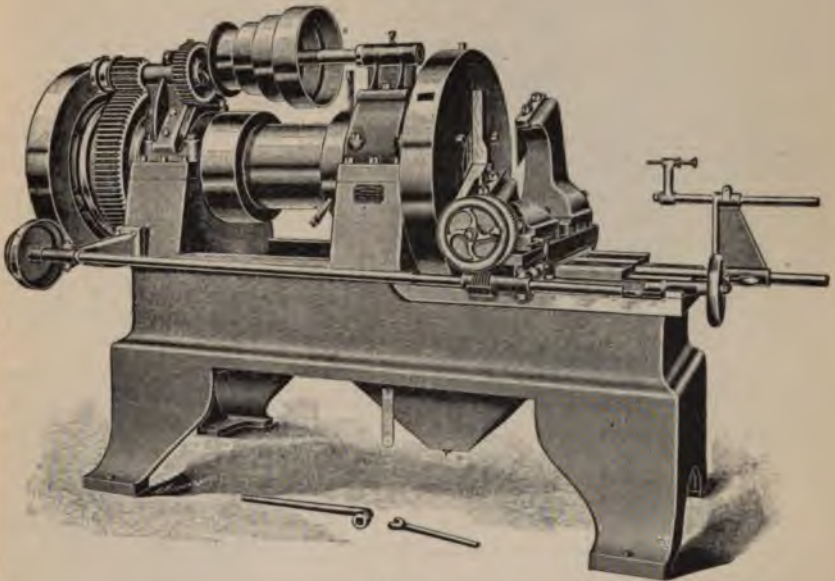


FIG. 11017.

DESCRIPTION FIG. 11017.

This machine will cut unfinished shaft from 2" to 10" diameter.

Chucks are 30" diameter, extra heavy and powerful.

Machine is furnished with oil pump and drip pans, not shown in the cut.

Built only in the cone-driven style.

Countershaft has two speeds with Hurlbut's patent slipper.

Tight and loose pulleys, 3 $\frac{1}{2}$ " x 14".

Speeds, 225 and 260 revolutions per minute.

Shipping weight, 6,500 lbs.

POWER HACK SAWS.

FAIRBANKS POWER HACK SAW.



FIG. 11818.

DESCRIPTION FIG. 11818.

The Fairbanks power hack saw is constructed on correct mechanical principles, for longest wear, and to obtain the best and greatest amount of service from hack saw blades.

Cuts on backward or pulling stroke, with weight of saw frame and levers lifted off the blade on its forward or idle stroke. This arrangement keeps the saw blade sharp longer, and enables it to do 30 per cent. more work than machines of ordinary construction.

Spring tension—not weights.—One of its valuable features is the spring tension, which acts on the saw frame, and is much more effective and convenient than the weights with which hack saws are ordinarily equipped.

The connection from the pulling end of saw blade to main lever is rigid.

The steel overhanging saw arm gives a constant tension to the blade, and facilitates the quick insertion of blades or changing for different lengths.

Change of stroke can be effected while the machine is in motion, thus utilizing the full length of the blade for effective work. The stroke may be varied from $6\frac{1}{4}$ " to 8", to suit the size of work being cut.

Cuts straight—no lost power.—It has means for adjusting the saw blade to make it cut straight or squarely through a piece of stock, even when the blade has more clearance, or is duller on one side than the other.

It has a driving clutch that locks the crank to the driving pulley, without end friction on the bearings, with its consequent loss of power.

An adjustable automatic stop.—This stops the machine when the cut is finished. This may be set to stop the machine when the saw has cut partly through a piece, and it will operate positively to within $\frac{1}{8}$ " from the point where it is desired to end the cut.

This machine is built in two sizes, viz.

No 1. Capacity 8" x 5". Will take saw blades from 9" to 14" long. Weight about 250 lbs.

No. 2. Capacity 10" x 5 $\frac{1}{2}$ ". Will take saw blades from 14" to 18" long. Weight about 300 lbs.

Each machine is regularly supplied with one saw blade only. Proper speed for operation of either size machine is about forty strokes per minute (40 revolutions per minute of pulley). Pulley is 14" diameter by 2 $\frac{1}{4}$ " face.

In view of the slow speed of operation of these machines, it is sometimes impossible to operate them successfully by belting direct from the line shaft. We are therefore prepared to furnish a special countershaft to interpose between the line shaft and the machine to decrease the belt speed. This is furnished at extra cost only.

POWER HACK SAWS.

UNIVERSAL POWER HACK SAW.

DESCRIPTION FIG. 11819.

This machine is constructed on an entirely new principle, great care having been taken to provide means whereby all kinds of sawing within its capacity may be done. It has gravity feed, years of experience with different styles of cold sawing machines having demonstrated that this is the most satisfactory way. The old style machines all have their saw frames located so that the saw does its cutting off one side of the machine, and outside of the work holding vise, so that the usefulness of these machines is confined to simply cutting sections off a bar. In the "Universal" the saw frame is located directly in the center of the machine and the saw does its cutting in the center of the work holding vise, thereby enabling the operator to do a greater variety of work than is possible on any other machine of its class. The illustration, Fig. 11819, shows a square block with a section sawed out and then mitered; it also shows a round piece of steel 6" x 2" split in twain; all mechanics will appreciate the advantage of this way over the old, i. e., of drilling a row of holes and then breaking apart with a chisel, to say nothing of the saving of expensive steel. Another improvement is provided in the crank, which is adjustable, so that the whole available length of the saw blades may be used; the pitman is also adjustable to correspond with the stroke of the saw. The machine is automatic and can be adjusted to stop at any point. The saw frame is also arranged to take blades from 10" to 14" inclusive. Any apprentice can operate a number of these machines, keeping all of them at work at the same time.



FIG. 11819.

Capacity.....	6" solids
Size of pulley.....	14" x 2 3/4"
Speed of pulley, revolutions.....	40 to 60
Length of saw blade, inclusive.....	10" to 14"
Net weight.....	225 lbs.

Note: 45 strokes per minute is fast enough for steel, 50 strokes for cast iron and 60 for brass.

NO. 1 SHOP SAW. SPECIFICATIONS FIG. 11820.

Capacity.....	4" x 4"
Stroke of saw blade.....	6"
Length.....	12"
Size of pulley.....	14" x 2 1/2"
Speed, revolutions per minute.....	50
Feed, per minute.....	1/16" to 1/8"
Floor space.....	18" x 30"
Height over all.....	36"
Net weight.....	136 lbs.
Weight, boxed for export.....	182 lbs.
Size, boxed for export.....	18" x 19" x 32"



FIG. 11820.

NO. 2 SHOP SAW.

SPECIFICATIONS FIG. 11821.

Capacity.....	5" x 5"
Stroke of saw.....	6"
Length.....	14"
Size of pulley.....	14" x 2 1/2"
Speed per minute, revolutions.....	50
Feed, per minute.....	1/16" to 1/8"
Floor space.....	19" x 34"
Height over all.....	41"
Net weight.....	150 lbs.
Weight, boxed for export.....	210 lbs.
Size, boxed for export.....	30"



FIG. 11821.

POWER HACK SAWS.

NO. 3 SHOP SAW.



FIG. 11822.

SPECIFICATIONS FIG. 11822.

Capacity	5" x 6"
Stroke of saw blade	6"
Length of saw blade	14"
Size of pulley	14" x 2 1/2"
Speed per minute, revolutions	50
Floor space	18" x 30"
Height over all	36"
Net weight	180 lbs.
Weight, boxed for export	230 lbs.
Size, boxed for export	18" x 30" x 31"

NO. 4 SHOP SAW.

SPECIFICATIONS FIG. 11823.

Capacity, solids	7" x 8"
Floor space	12" x 32"
Height over all	3' 2"
Size of pulley	14" x 3"
Height of work table	21"
Speed per minute, revolutions	50
Feed, per minute	1/4" to 1"
Stroke of saw blade	6"
Length of saw blade	17"
Thickness of saw blade	1/8"
Net weight	270 lbs.
Gross weight	360 lbs.
Size, boxed for export	20" x 32" x 31"



FIG. 11823.

NO. 4A SWIVEL VISE SAW.

DESCRIPTION FIG. 11824.

This machine has been designed to meet a large demand for a saw similar to our standard No. 4 shop saw, but arranged with a swivel vise so that cuts can be made at any angle up to 45°.

The machine is of the same capacity and design as the standard No. 4 and on our latest design the swivel vise is attached to an adjustable lowering bracket as shown on cut.

This machine can be used only for cutting at angles on material up to 7" thick, and the adjustable bracket is available only for straight cuts, the same as on the standard No. 4 machine.



FIG. 11824.

COLD SAWS.

DESCRIPTION FIG. 11825.

Will cut off stock with smooth, parallel ends in from one-quarter to one-sixth the time required by a power hack saw.

Cuts off round, square and other shaped stock up to 3½" round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and latches when clear back.

Gravity feed, adjustable by moving weight out on lever.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about fifteen minutes.

Tight and loose pulleys on worm shaft run 500 revolutions per minute.

Weight, 350 lbs. skidded

NO. 1 COLD SAW.



FIG. 11825.

NO. 2 COLD SAW.



FIG. 11826.

DESCRIPTION FIG. 11826.

Will cut off stock with smooth, parallel ends.

Cuts off round, square and other shaped stock up to 5" round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and provided with quick hand return.

Gravity feed, changes made instantly.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about twenty minutes.

Tight and loose pulleys on worm shaft, 12" x 2¾", should run 480 revolutions per minute.

Weight, 1,000 lbs. skidded.

NO. 3 COLD SAW.



FIG. 11827.

DESCRIPTION FIG. 11827.

Will cut off stock with smooth, parallel ends.

Cuts off round, square and other shaped stock up to 6" round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and provided with quick hand return.

Variable friction feed, changes made instantly. Automatic trip.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about thirty minutes.

Tight and loose pulleys on worm shaft, 12" x 3¼", should run 440 revolutions per minute.

v

POWER HACK SAWS.

NO. 3 SHOP SAW.



FIG. 11822.

SPECIFICATIONS FIG. 11822.

Capacity	5' x 6'
Stroke of saw blade	6"
Length of saw blade	14"
Size of pulley	14" x 2½"
Speed per minute, revolutions	50
Floor space	18" x 30"
Height over all	36"
Net weight	180 lbs.
Weight, boxed for export	230 lbs.
Size, boxed for export	15" x 20" x 31"

NO. 4 SHOP SAW.

SPECIFICATIONS FIG. 11823.

Capacity, solids	7' x 8"
Floor space	12" x 32"
Height over all	3' 2"
Size of pulley	14" x 3"
Height of work table	21"
Speed per minute, revolutions	50
Feed, per minute	¼" to 1"
Stroke of saw blade	6"
Length of saw blade	17"
Thickness of saw blade	⅛"
Net weight	270 lbs.
Gross weight	360 lbs.
Size, boxed for export	20" x 32" x 31"



FIG. 11823.

NO. 4A SWIVEL VISE SAW.

DESCRIPTION FIG. 11824.

This machine has been designed to meet a large demand for a saw similar to our standard No. 4 shop saw, but arranged with a swivel vise so that cuts can be made at any angle up to 45°.

The machine is of the same capacity and design as the standard No. 4 and on our latest design the swivel vise is attached to an adjustable lowering bracket as shown on cut.

This machine can be used only for cutting at angles on material up to 7" thick, and the adjustable bracket is available only for straight cuts, the same as on the standard No. 4 machine.



FIG. 11824.

COLD SAWS.

DESCRIPTION FIG. 11625.

Will cut off stock with smooth, parallel ends in from one-quarter to one-sixth the time required by a power hack saw.

Cuts off round, square and other shaped stock up to $3\frac{1}{2}$ " round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and latches when clear back.

Gravity feed, adjustable by moving weight out on lever.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about fifteen minutes.

Tight and loose pulleys on worm shaft run 500 revolutions per minute.

Weight, 350 lbs. skidded.

NO. 1 COLD SAW.



FIG. 11625.

DESCRIPTION FIG. 11626.

Will cut off stock with smooth, parallel ends.

Cuts off round, square and other shaped stock up to 3" round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and provided with quick hand return.

Gravity feed, changes made instantly.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about twenty minutes.

Tight and loose pulleys on worm shaft, $12" \times 2\frac{1}{4}"$, should run 460 revolutions per minute.

Weight, 1,000 lbs. skidded.

NO. 2 COLD SAW.



FIG. 11626.

DESCRIPTION FIG. 11627.

Will cut off stock with smooth, parallel ends.

Cuts off round, square and other shaped stock up to 6" round.

Saw is driven through steel gears, hobbed worm wheel, steel worm provided with ball thrust bearing and splined worm shaft.

Saw carriage is gibbed to frame, and provided with quick hand return.

Variable friction feed, changes made instantly. Automatic trip.

Efficient saw grinder furnished with each machine. Time required to sharpen saw, about thirty minutes.

Tight and loose pulleys on worm shaft, $12" \times 3\frac{1}{4}"$, should run 440 revolutions per minute.

Weight, 1,600 lbs. skidded.

NO. 3 COLD SAW.



FIG. 11627.

COLD SAWS.

NO. 3 C B METAL COLD SAW



FIG. 11828.

DESCRIPTION FIG. 11828.

The saw spindle is made extra large and runs in a solid bearing which is of the strongest construction possible, and makes the machine very rigid, with no vibration in a heavy cut.

The drive is obtained through a case-hardened steel worm with ball bearing thrust and bronze wheel running in oil.

The feed of the saw is through a rack and pinion, the pinion being driven by worm and wheel. The wheel runs between friction washers, and the friction may be regulated to suit the nature of work.

An automatic stop shifts the belt when the cut is finished and the carriage may be quickly returned by hand.

The table is provided with a V for holding round, square or hexagon stock, and two clamps are provided, the screws of which are offset to bring them close to the saw in cutting short pieces.

Oil pump.—A geared pump, which requires no priming, runs in the oil tank and furnishes an extra large supply of oil to the saw. This keeps the saw cool and thoroughly washes away the chips.

The base is made large to catch all of the drip, and keeps the floor clean.

The oil tank is part of the base casting, and all oil drains into it.

A grinder is furnished with the machine by which the saw may be sharpened on its own arbor. This insures its being true and each tooth doing its share. The grinder is driven from the loose pulley, and to sharpen the saw it is only necessary to unmesh the worm.

SPECIFICATIONS.

Saw.....	13½" diameter, ⅜" thick.
Depth of cut.....	4½"
Saw arbor bearing in box.....	10"
Saw arbor diameter.....	3½"
Capacity of vise.....	4"
From floor to work table.....	15½"
Floor space.....	40" x 24"
Weight, net.....	650 lbs.
Tight and loose pulleys.....	12" x 3"
Speed of pulleys, revolutions per minute.....	200
One saw with machine.	

COLD SAWS.

NO. 5 METAL SAWING MACHINE.

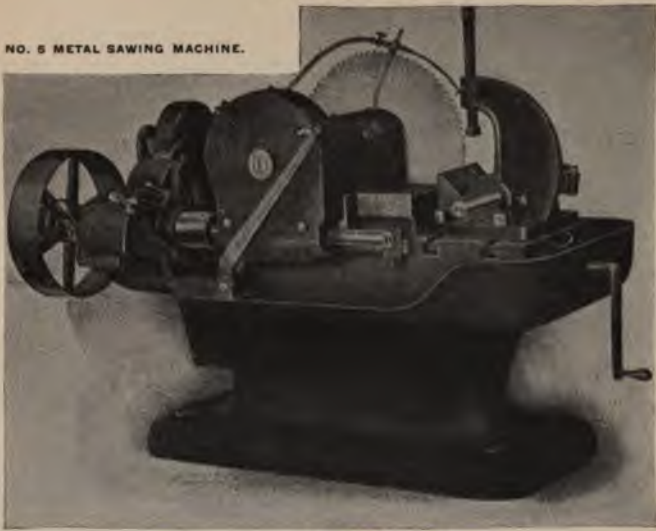


FIG. 11829.

DESCRIPTION FIG. 11829.

The No. 5 machine has been very carefully designed and is made as good as possible at every point. It has several features found on no other machine which we believe are necessary in a perfect saw.

The carriage is made solid and fitted to the ways with a taper gib, doing away with all springing which arises from using gibs held by screws and allowing every particle of slack caused by wear to be taken up. The saw arbor bearing is also made solid and an extra large arbor is used which is case-hardened and ground and fitted into the bearing so that there is no slack. These are the most important points, as it is absolutely necessary that there be no lost motion in the ways or spindles when doing heavy work. The end of the spindle which carries the saw is ground to a taper and fitted with an expanding bushing, insuring the saw being absolutely central every time and each tooth doing its share of the cutting.

The feed is another important point and another where there should be no lost motion. The feed on No. 5 machine is by means of a large screw placed as nearly as possible directly back of the saw. This screw is $2\frac{1}{2}$ " in diameter by 9" long and runs in a split nut of the same length allowing all the slack to be taken out of the feed. The feed screw is turned by a worm and wheel driven by a five step cone of spur gears.

The saw is driven by a triple lead worm and worm wheel $11\frac{3}{4}$ " diameter, through steel gears, making the smoothest possible drive. The drive shaft is provided with back gears giving two speeds, a slow speed for hard stock and a faster one for soft.

A generous drip pan is furnished which returns all the oil to the tank at the back of the machine. A positive gear pump which requires no priming furnishes an abundant supply of oil to the saw.

An automatic stop cuts out the feed and returns the carriage for another cut. The work table is provided with T slots for holding any kind of vise for special work. The work may also be strapped directly to the table and the full section of the saw outside of the collars may be utilised. A vise for ordinary round or square stock is furnished, also a stand to support the free end of the stock.

SPECIFICATIONS.

Saw	20" diameter, $\frac{5}{8}$ " thick	Saw arbor diameter.....	4 $\frac{1}{2}$ "
Depth of saw cut.....	6 $\frac{3}{4}$ "	Saw collars.....	9"
Speed of drive shaft direct drive, revolutions per minute.....	192	Traveling slide movement.....	7"
Speed of drive shaft back gear, revolutions per minute.....	108	Drive pulley.....	16" diameter, 4" face
Speed of saw (direct), turns per minute..	6.7	Positive gear feed.	
Speed of saw (back gear), turns per minute.....	3.8	Five changes on direct drive.	
Saw arbor bearing in box.....	$\frac{1}{8}$ "	Five changes on back gear from.....	$\frac{1}{2}$ " to $1\frac{1}{2}$ " per minute
		From floor to work table.....	24"
		Floor space.....	60" x 30"
		Weight.....	2,100 lbs.

COLD SAWS.

NO. 7 BAR COLD SAW.



FIG. 1902.

No. 7 Bar Cold Saw. This machine is especially designed for cutting cold-chambered bars of all sizes and shapes. The saw is driven by a hand crank and is mounted on a heavy cast-iron frame. The saw is furnished with two standard changes that can be placed in 10 or 20 degrees, allowing for cutting of steel, cast iron, brass, copper, aluminum, and other materials.

DESCRIPTION FIG. 1902.

The machine illustrated was designed and built to meet the demand for a cold saw cutting-off machine that would be low in cost, that would cut material accurately and with speed, is low priced, having facilities to be easily converted and to be practically "handmade."

The machine will cut 12" rounds, 10" squares, 10" beams, 10" channels, 10" angles, 10" fl. rails and other materials. It will cut low material either straight or at an angle and is especially adapted for general shop use and for special processes.

The machine is furnished with removable automatic feed and automatic safety stop and gear return by hand. The automatic stop regulates the depth of cut in the operation of the machine to any depth up to 10" and will throw out the feed when the capacity of the machine is reached. The saw is driven by a hand crank and is mounted on a heavy cast-iron frame. The saw is furnished with two standard changes that can be placed in 10 or 20 degrees, allowing for cutting of steel, cast iron, brass, copper, aluminum, and other materials.

DESCRIPTION FIG. 1903.

Machine of No. 8 Cold Saw. Capacity 12". Machine has a variable automatic feed, automatic safety stop and automatic gear return by hand for cutting off round, square, rectangular and other materials. The saw is furnished with two standard changes that can be placed in 10 or 20 degrees, allowing for cutting of steel, cast iron, brass, copper, aluminum, and other materials. The machine is especially designed for cutting cold-chambered bars of all sizes and shapes. The saw is driven by a hand crank and is mounted on a heavy cast-iron frame. The saw is furnished with two standard changes that can be placed in 10 or 20 degrees, allowing for cutting of steel, cast iron, brass, copper, aluminum, and other materials.

The machine is furnished with two standard changes that can be placed in 10 or 20 degrees, allowing for cutting of steel, cast iron, brass, copper, aluminum, and other materials.

NO. 12 BAR COLD SAW. SWITCH-OPERED.



FIG. 1903.

NO. 10 BAR COLD SAW.



FIG. 1904.

DESCRIPTION FIG. 1903.

The machine is especially designed and built to meet the demand for a cold saw cutting-off machine that would be low in cost, that would cut material accurately and with speed, is low priced, having facilities to be easily converted and to be practically "handmade."

The machine will cut 12" rounds, 10" squares, 10" beams, 10" channels, 10" angles, 10" fl. rails and other materials. It will cut low material either straight or at an angle and is especially adapted for general shop use and for special processes.

COLD SAWS.

NO. 200 BAR COLD SAW.

DESCRIPTION FIG. 11833.

Has a saw 36" diameter.

Capacity for round bars, 11½" diameter.

For square bars, 10½'.

Larger sizes will be designed and built for special work.

Complete specifications will be sent on application.



FIG. 11833.

NO. 38 STEEL FOUNDRY COLD SAW.



FIG. 11834.

DESCRIPTION FIG. 11834.

This machine is equipped with a 40" diameter high-speed steel-inserted tooth saw blade; capacity for sawing off gates and risers 13" in diameter. This machine designed expressly for sawing off risers and gates from locomotive wheel centers, side frames, and other odd-shaped castings. Belt or motor drive.

NO. 81 STEEL FOUNDRY COLD SAW.



FIG. 11835.

DESCRIPTION FIG. 11835.

This machine is equipped with a 40" diameter high-speed steel-inserted tooth saw blade; capacity for sawing off risers and gates 13" in diameter. This machine is built in three sizes for sawing gates and risers, 13", 17" and 20" in diameter. Belt or motor drive.

COLD SAWS.

NO. 7 BAR COLD SAW.



FIG. 11830.

on any part of the platen or entirely removed, permitting of a large variety of jig and special work. The machine carries a 22" saw blade of very thin gauge, effecting an economy of stock as a minimum amount of material is removed when cutting.

DESCRIPTION FIG. 11830.

The machine illustrated was designed and built to meet the demand for a cold saw cutting-off machine that would be low in its cost; that would cut materials accurately and with speed; to have good wearing qualities; to be easily operated and to be practically "fool-proof."

The machine will cut 6" rounds, 5½" squares, 8" I beams, 10" channels, 6" angles, 100 lb. rails and other materials. It will cut these materials either straight or at an angle and is consequently adapted for general shop use and for special purposes.

The machine is furnished with variable automatic feed and automatic safety top and quick return by hand. The automatic stop regulates the depth of cut at the option of the operator to any depth up to 6", and will throw out the feed when the capacity of the machine is reached. The saw is driven by a hardened crucible steel worm and phosphor bronze worm wheel. The saw arbor is of hammered crucible steel and liberally proportioned. The saw runs in a trough and is kept cool and well supplied with cutting fluid. The machine is furnished with two swiveled clamps that can be placed

DESCRIPTION FIG. 11831.

Diameter of saw blade 28". Capacity 8". Machine has a variable automatic feed, automatic safety stop and swiveled clamp on table for holding different shapes and sizes of material to be cut straight or at an angle. The clamp can be removed for doing special or jig work. The machine is driven by a hardened crucible steel worm, phosphor bronze worm wheel and compound gearing. The gears are made of crucible steel and cut from solid blanks. The spindle is made of hammered crucible steel.

Regular machine is furnished belt-driven. Motor drive, as shown, is extra.

NO. 3E BAR COLD SAW. MOTOR-DRIVEN.



FIG. 11831.

NO. 15 BAR COLD SAW.



FIG. 11832.

DESCRIPTION FIG. 11832.

This machine carries a 30" high-speed steel-inserted tooth saw blade and has capacity for cutting off 10" round stock.

Regularly built for belt drive, but can be equipped with motor drive at additional cost, if desired.

COLD SAWS.

NO. 200 BAR COLD SAW.

DESCRIPTION FIG. 11833.

Has a saw 30" diameter.
Capacity for round bars, 11½" diameter.
For square bars, 10½".
Larger sizes will be designed and built for special work.
Complete specifications will be sent on application.



FIG. 11833.

NO. 38 STEEL FOUNDRY COLD SAW.



FIG. 11834.

DESCRIPTION FIG. 11834.

This machine is equipped with a 40" diameter high-speed steel-inserted tooth saw blade; capacity for sawing off gates and risers 13" in diameter. This machine designed expressly for sawing off risers and gates from locomotive wheel centers, side frames, and other odd-shaped castings. Belt or motor drive.

NO. 81 STEEL FOUNDRY COLD SAW.



FIG. 11835.

DESCRIPTION FIG. 11835.

This machine is equipped with a 40" diameter high-speed steel-inserted tooth saw blade; capacity for sawing off risers and gates 13" in diameter. This machine is built in three sizes for sawing gates and risers, 13", 17" and 20" in diameter. Belt or motor drive.

COLD SAWS.

NO. 7 I BEAM COLD SAW.



FIG. 11836.

DESCRIPTION FIG. 11836.

This machine is designed especially for cutting off I beams, channel, angle iron and all kinds of structural iron work. The capacity is 15" I beams. Diameter of saw is 22". It has a variable automatic feed, automatic safety stop and swiveled clamp on table for holding different shapes and sizes to be cut straight or at an angle. The saw runs in a trough and keeps well lubricated at all times. Saw spindle is made of hammered crucible steel and is driven by a hardened curcible steel worm and phosphor bronze worm wheel.

NO. 30 I BEAM COLD SAW.



FIG. 11837.

DESCRIPTION FIG. 11837.

30" diameter saw cutting-off machine
30" diameter saw blade; capacity 20" I
for structural shapes. Belt or motor

NO. 204 AND NO. 205 I BEAM COLD SAWS.

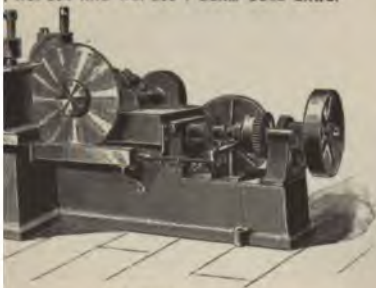


FIG. 11838.

DESCRIPTION FIG. 11838.

Machine designed principally for cutting off I beams. Can be used on all classes of cutting generally done by the friction saw. The work table of the machine is made so that, when cutting on the largest I beam of the capacity of the machine, the center of the I beam will be on a line with the center of the saw.

	Machine Number.		
	204	204	205
Diameter of saw....	24"	30"	36"
Capacity for I beams	15"	20"	24"

COLD SAWS.

NO. 2 COMBINATION COLD SAW.

DESCRIPTION FIGS. 11839 AND 11840.

These machines are built in four sizes and can be furnished for belt drive as shown in Fig. 11839 or with motor drive as shown in Fig. 11840.



FIG. 11839.

NO. 4 COMBINATION COLD SAW. MOTOR-DRIVEN.



FIG. 11840.

SPECIFICATIONS FIGS. 11839 AND 11840.

Size of Machine,	No. 1.	No. 2.	No. 3.	No. 4.
Diameter of saw.....	20"	26"	32"	36"
Capacity on top table.....	5" x 16"	7" x 24"	9" x 32"	11½" x 36"
Capacity for I beams on a square or miter cut on bottom table.....	19"	13"	20"	24"
Capacity for round bars in V clamps.....	5"	7"	9"	11½"

HOT METAL SAWING MACHINE.

DESCRIPTION FIG. 11841.

This saw is designed for general use in machine, locomotive, and other blacksmith shops where belt power is available. It will cut iron and steel at an ordinary red heat with a facility not to be accomplished by any other means, and requires little or no care to keep in order; the wear on the teeth being hardly perceptible after months of use.

- Saw will cut to a depth of 8".
- Work 12" wide can be placed in front of saw.
- Speed of saw, 1,400 revolutions.
- Speed of countershaft, 350 revolutions.
- Tight and loose pulleys, 12" diameter for 6" belt.
- Weight, 2,000 lbs.



FIG. 11841.

METAL BAND SAWS.

NO. 1 METAL BAND SAW.

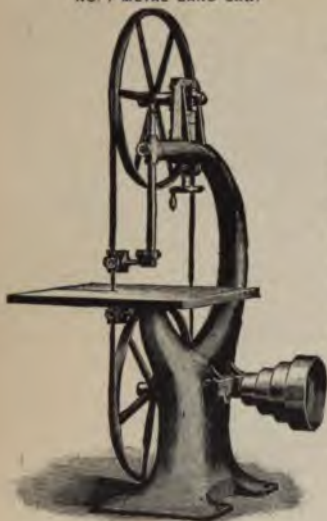


FIG. 11842.

DESCRIPTION FIG. 11843.

This machine has a tight and loose pulley 12" diameter by $3\frac{1}{2}$ " face, runs direct and should make 200 revolutions per minute. Designed specially for cutting brass, copper, aluminum, marble, fibers, etc. We furnish with No. 0 and No. 1 machines hand cut-off carriage and extra slitting gauge, which are not shown in cut, being new improvements recently brought out.

Every brass mill should have one because there is no better way for sawing up tubing, rods and bars, sheet metals, etc.

Every brass worker should have one because it is specially adapted for scroll work. For trimming gate castings, stamped work, metal patterns, etc., this machine is a valuable acquisition to the factory.

DESCRIPTION FIG. 11842.

This machine is fitted with a four-cone driving pulley, geared back 4 to 1 with cut gears which are concealed in base of machine casting. A cone countershaft is furnished with each machine fitted with an 8" x $3\frac{1}{2}$ " tight and loose pulley, which gives a large range of speed, accommodating different temper and conditions of metal.

This machine is fitted with slitter gauge and new improved cut-off carriage and is specially designed to meet all the requirements of a first class tool. It is well and substantially built and embodies many new features which cannot fail to be appreciated, the frame is cast solid in one piece, making a good stiff machine. The 30" pulley wheels are made from the best machinery casting, turned perfectly true and evenly balanced. All bearings are fitted with taper sleeve bushings that can be replaced from stock at a mere trifle. Guides are from our latest improved pattern. Gears are machine cut, upper pulley has a lateral adjustment the easier to manipulate the saw, table is 30" x 30" planed perfectly true.

This machine takes a 15', 10" saw, has a 30" swing between saw and casting, and will accommodate 18" between table and guide.

Each machine is furnished complete with cone countershaft, upper and lower patent guides, and one-half dozen saws ready for use. Weight, 1,000 lbs. Floor space 4' x $3\frac{1}{2}$ ". Countershaft should run 180 revolutions per minute.

NO. 0 METAL BAND SAW.

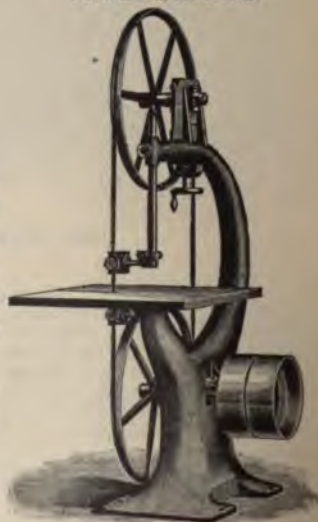


FIG. 11843.

METAL BAND SAWS.

DESCRIPTION FIG. 11644.

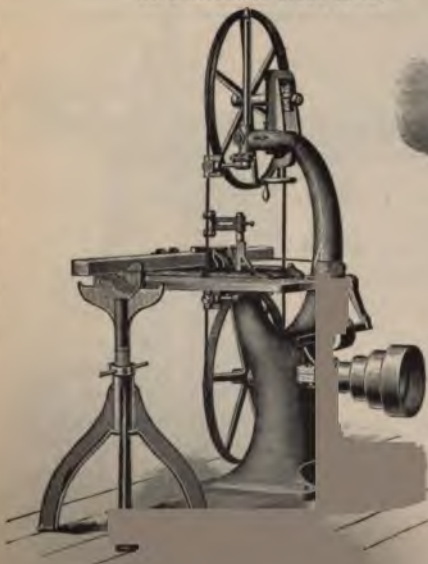
Adjustable to work stock from $\frac{1}{4}$ " to 1" thick; will cut to the center of 22". For slitting brass, copper, aluminum, silver, bronze, fiber, etc., there is no better tool in existence, being especially adapted for ship builders, boiler manufacturers, rolling mills manufacturers of electric appliances, etc., working sheet metal.

The speed and accuracy of this machine is guaranteed; we can usually show a net saving of from 40 to 50 per cent. where it is adopted for general use. It is always ready, easily adjusted to work any width or thickness of stock, insures perfect, true, smooth edges, has a range of speed of from 7" to 40" per minute, accommodating different thicknesses and conditions of metals.

Both upper and lower feed rolls are hardened steel and driven direct. Machine is full size, 30" pattern, and weighs complete, 1,000 lbs.; tight and loose pulley 12" x 4"

Each machine is furnished with patent upper and lower non-friction guides and one-half dozen saws ready for use.

NO. 2 AUTOMATIC STOCK CUTTER



NO. 3 METAL BAND SAW SLITTING MACHINE.



FIG. 11644.

DESCRIPTION FIG. 11645.

This machine set up in or near your tool room will enable the attendant to reduce your stock cutting to the smallest minimum cost. It has all the advantages of our No. 1 size with the additional advantage of an automatic power feed chuck, for straight and bevel cutting. Chuck can be removed instantly, thus converting this machine into a No. 1 size for scroll work, etc. Chuck is so applied to table that work being sawed clears the other end of revolving saw, at the same time keeping saw true to cut, this is an essential feature and enables any length stock to be worked.

For cutting off brass and steel tubings, die stock, and general machine shop work, this machine will do the work of any two cutting-off tools on the market.

Weight, 1,200 lbs.; floor space, 4' x 3 $\frac{1}{2}$ '; speed of counter-shaft, 180 revolutions per minute.

METAL BAND SAWS.

NO. 1 METAL BAND SAW.



FIG. 11842.

DESCRIPTION FIG. 11843.

This machine has a tight and loose pulley 12" diameter by $3\frac{1}{2}$ " face, runs direct and should make 200 revolutions per minute. Designed specially for cutting brass, copper, aluminum, marble, fibers, etc. We furnish with No. 0 and No. 1 machines hand cut-off carriage and extra slitting gauge, which are not shown in cut, being new improvements recently brought out.

Every brass mill should have one because there is no better way for sawing up tubing, rods and bars, sheet metals, etc.

Every brass worker should have one because it is specially adapted for scroll work. For trimming gate castings, stamped work, metal patterns, etc., this machine is a valuable acquisition to the factory.

DESCRIPTION FIG. 11842.

This machine is fitted with a four-cone driving pulley, geared back 4 to 1 with cut gears which are concealed in base of machine casting. A cone countershaft is furnished with each machine fitted with an $8" \times 3\frac{1}{2}"$ tight and loose pulley, which gives a large range of speed, accommodating different temper and conditions of metal.

This machine is fitted with slitter gauge and new improved cut-off carriage and is specially designed to meet all the requirements of a first class tool. It is well and substantially built and embodies many new features which cannot fail to be appreciated, the frame is cast solid in one piece, making a good stiff machine. The 30" pulley wheels are made from the best machinery casting, turned perfectly true and evenly balanced. All bearings are fitted with taper sleeve bushings that can be replaced from stock at a mere trifle. Guides are from our latest improved pattern. Gears are machine cut, upper pulley has a lateral adjustment the easier to manipulate the saw, table is 30" x 30" planed perfectly true.

This machine takes a 15", 10" saw, has a 30" swing between saw and casting, and will accommodate 18" between table and guide.

Each machine is furnished complete with cone countershaft, upper and lower patent guides, and one-half dozen saws ready for use. Weight, 1,000 lbs. Floor space 4' x 31 $\frac{1}{2}$ ". Countershaft should run 180 revolutions per minute.

NO. 0 METAL BAND SAW.

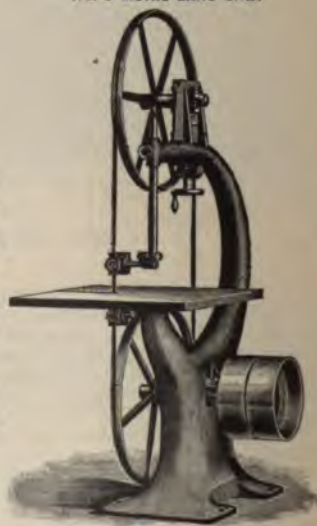


FIG. 11843.

METAL BAND SAWS.

DESCRIPTION FIG. 11844.

Adjustable to work stock from $\frac{1}{2}$ " to 1" thick; will cut to the center of 22". For slitting brass, copper, aluminum, silver, bronze, fiber, etc., there is no better tool in existence, being especially adapted for ship builders, boiler manufacturers, rolling mills manufacturers of electric appliances, etc., working sheet metal.

The speed and accuracy of this machine is guaranteed; we can usually show a net saving of from 40 to 50 per cent. where it is adopted for general use. It is always ready, easily adjusted to work any width or thickness of stock, insures perfect, true, smooth edges, has a range of speed of from 7" to 40" per minute, accommodating different thicknesses and conditions of metals.

Both upper and lower feed rolls are hardened steel and driven direct. Machine is full size, 30" pattern, and weighs complete, 1,000 lbs.; tight and loose pulley 12" x 4"

Each machine is furnished with patent upper and lower non-friction guides and one-half down saws ready for use.

NO. 2 AUTOMATIC STOCK CUTTER.

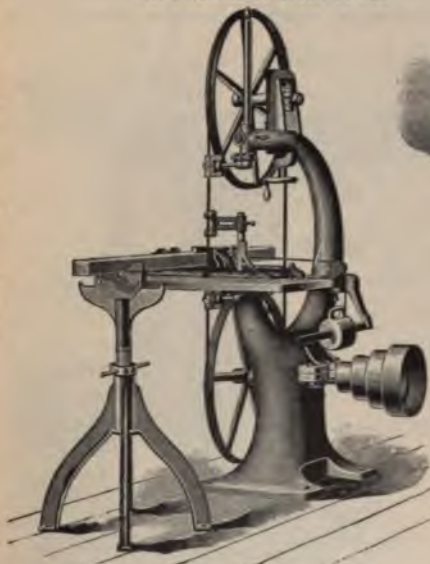


FIG. 11845.

NO. 3 METAL BAND SAW SLITTING MACHINE.

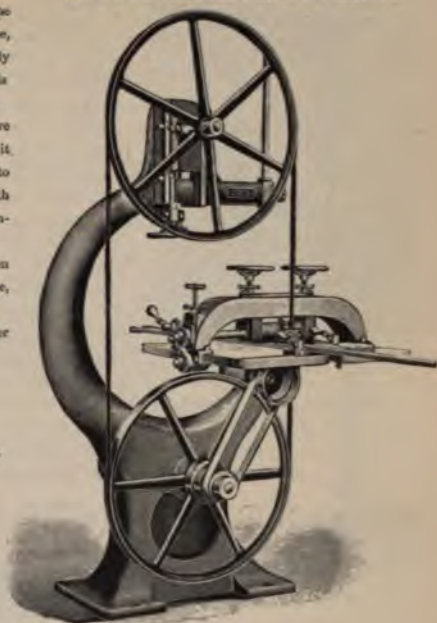


FIG. 11844.

DESCRIPTION FIG. 11846.

This machine set up in or near your tool room will enable the attendant to reduce your stock cutting to the smallest minimum cost. It has all the advantages of our No. 1 size with the additional advantage of an automatic power feed chuck, for straight and bevel cutting. Chuck can be removed instantly, thus converting this machine into a No. 1 size for scroll work, etc. Chuck is so applied to table that work being sawed clears the other end of revolving saw, at the same time keeping saw true to cut, this is an essential feature and enables any length stock to be worked.

For cutting off brass and steel tubings, die stock, and general machine shop work, this machine will do the work of any two cutting-off tools on the market.

Weight, 1,200 lbs.; floor space, 4' x 3 $\frac{1}{2}$ '; speed of counter-shaft, 180 revolutions per minute.

METAL SAW TABLES.



FIG. 11846.

Will saw sheet, rod and tube brass and copper, fiber, hard rubber, mother-of-pearl, printers' furniture, electrotype plates, and is indispensable to instrument makers, electrical manufacturers, chandelier makers, electrotypers and metal workers.

This machine is regularly supplied arranged for belt drive as shown in the illustration. If desired, however, we can furnish it complete with direct connected electric motor wound for any voltage, making a very complete electrically driven machine of the entire outfit.

Extra saws can be furnished for this machine, either 4", 5" or 6" diameter, at additional cost.

DESCRIPTION FIG. 11847.

This machine was especially designed for workers in metal, horn, ivory, cabinet makers, etc.

The base is cast in one piece, the upper part being securely bolted to the base, thus insuring a perfectly rigid machine. The table is 24" x 28", fitted with a groove on each side of the saw, so that right or left hand miters may be cut.

If required, a ripping gauge can be fitted to the saw at an additional cost.

The arbor is 1", and the machine will take saws from 6" to 12" in diameter.

Tight and loose pulleys, 8" x 3".

Driving pulley, 16" x 3".

Speed of countershaft, 200 to 250 revolutions per minute.

DESCRIPTION FIG. 11846.

Ready for work, nothing but driving belt from main shaft required. Table swings entirely open or may be set to saw to any depth desired. Slitting gauge may be set from 0° to 12° wide.

Cross cut gauge will swing from 90° either way to any practical angle.

Ample bearings for both saw mandrel and counter.

Belt shifting mechanism is simple, convenient and effective.

A removable throat plate allows saw to be used for wood work up to 6" diameter.

Center of saw mandrel only 1" below surface of table, thus permitting the use of small diameter saws and consequent maximum power and accuracy.

Improved device for holding saw mandrel from turning while attaching or removing saws.

Weight, 160 lbs.

Owing to peculiar construction of countershaft the machine may be set at almost any position with the main shaft.

Construction is of the best workmanship throughout, and the accuracy of all parts will produce saw cuts almost equal to milling machine work.

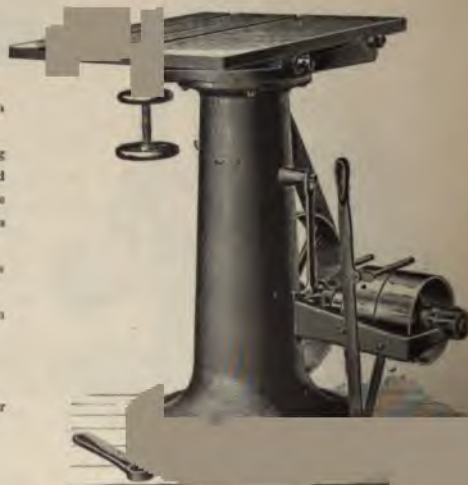


FIG. 11847.



FIG. 11840.

bushing die in the face of the machine and against an adjustable gauge, where it is cut off by rapidly revolving cutters. There is no straightener attached to this machine, for where wire is cut in such short lengths the natural curve is almost imperceptible, and straightening the wire is therefore unnecessary. This machine is made only in one size, and will cut wire of $\frac{1}{4}$ " and smaller diameter into lengths of 1' and shorter at the rate of 600 lengths per minute.

Each machine is provided with one set of feeding rolls. Countershaft furnished at extra cost.
Gross weight, 300 lbs. Net weight, 250 lbs.



FIG. 11850.

There is included with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or babbit, as the kind of wire to be worked may require), and one set of feeding and cutting tools which we can arrange to work from two to three consecutive sizes of wire within the capacity of the machine. In sending orders or further inquiries be sure to specify the sizes and kinds of wire for which the machine is required, and when the sizes are expressed in numbers give name of wire gauge used.

ROTARY WIRE STRAIGHTENERS.



FIG. 11851.



FIG. 11852.

= following page.

HAND WIRE CUTTER.

DESCRIPTION FIG. 11845.

This machine is offered as a practical and servicable tool for cutting up wire or rod that has been previously straightened. It is not a toy like most so-called hand wire cutters on the market, but a strong, well made machine calculated to meet the wants of those who occasionally desire to cut up a small quantity of wire, or for use in small shops where the work is largely done by hand power.

Machine is made in four sizes, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", and $\frac{3}{4}$ ".

Weights:

$\frac{1}{4}$ " gross, 85 lbs. Net, 80 lbs.
 $\frac{3}{8}$ " gross, 135 lbs. Net, 130 lbs.

$\frac{1}{2}$ " gross, 215 lbs. Net, 210 lbs.
 $\frac{3}{4}$ " gross, 330 lbs. Net, 320 lbs.

Note: The cut shows a round weight at the lower end of the cutting lever; this is furnished with the $\frac{1}{4}$ " and $\frac{3}{8}$ " sizes only.

ROTARY WIRE CUTTER.

DESCRIPTION FIG. 11849.



FIG. 11849.

This machine is run by belt power and is designed for cutting wire into short pieces, such as rivets used in the manufacture of cutlery and kindred articles. In this machine a pair of feeding rolls are arranged to take the wire direct from the coil, feed it out through a

COMBINED HAND AND POWER WIRE STRAIGHTENING AND CUTTING MACHINES.

DESCRIPTION FIG. 11850.

The combined hand and power wire straightening and cutting machine is a combination of a rotary wire straightener and feeding rolls run by power and a lever for cutting by hand. It is designed for straightening wire and cutting it into short pieces, or into long lengths that are to be cut again.

Where the size of wire and length to be cut is such as will not spring or drop out of line, it can be cut accurately by means of the gauge, but long lengths can only be cut where exactness is not essential. For cutting long lengths the machine can be used in connection with a trough in which the wires may be allowed to feed out to the required length.

Where a large quantity of wire is to be handled, this machine is not so well adapted as the "medium" or "long cut" machines described on following pages, although an experienced operator can manipulate quite rapidly.

This machine is built in six sizes, viz.: $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1", each machine being capable of working many sizes of wire by having the necessary feeding and cutting tools.

ROTARY WIRE STRAIGHTENERS.

ONE INCH ROTARY WIRE STRAIGHTENER.

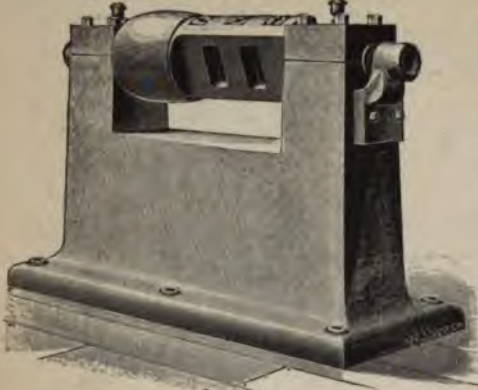


FIG. 11853.

DESCRIPTION FIGS. 11851 TO 11853.

These illustrations represent the various sizes and styles of rotary wire straighteners used for straightening wire of 1" diameter and smaller. The $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " sizes are made only with five dies and tight pulley. (The $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", and $\frac{3}{4}$ " sizes are made with both three and five dies, with tight pulley, or with tight and loose pulleys.) The $\frac{1}{2}$ ", $\frac{3}{4}$ ", and $\frac{1}{2}$ " sizes are made with both three and five dies, but with tight pulley only. The 1" size is made with three dies and tight pulley only.

The machines, from the $\frac{3}{8}$ " to the $\frac{1}{2}$ " sizes inclusive, can be bolted to the top of a bench, or we mount them upon iron pillars when so ordered. The $\frac{3}{4}$ " and 1" sizes can also be bolted to the top of a bench if preferred, but owing to their weight they are usually ordered mounted upon legs. The 1" size is made with a hollow iron base for bolting to the floor.

SELF-FEEDING ROTARY STRAIGHTENER.



FIG. 11854.

SELF-FEEDING WIRE STRAIGHTENERS.

DESCRIPTION FIGS. 11854 AND 11855.

These machines were originally designed for use in the manufacture of insulated wire, and in this connection are used for straightening and feeding the wire into the covering machine. They can also be used to good advantage in connection with automatic wire working machines where a continuous feed is required.

The self-feeding rotary straightener consists of a five die rotary straightener with single pulley, and a pair of feeding rolls for drawing the wire through the straightener, and feeding it into another machine, or out upon a bench as may be required. The rotary straightener and feeding rolls are run by independent belts from an overhead countershaft. These machines are made in five sizes, viz.: $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", and $\frac{1}{2}$ ". The $\frac{1}{2}$ " size, however, being so heavy, is mounted upon a hollow iron base instead of the central pillar shown in the cut.

SELF-FEEDING ROLL STRAIGHTENER.



FIG. 11855.

Each machine is capable of working wire of a diameter indicated by its size and smaller.

The self-feeding roll straightener consists of a twelve roll straightener and a pair of feeding rolls, and can be used in the same manner as the self-feeding rotary straightener described above, although on some classes of work the roll straightener is preferable and for others the rotary is the best.

The self-feeding roll straighteners we make in four sizes, viz.: $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", and as with the rotary straighteners, each machine is capable of working wire of the diameter indicated by its size and smaller.

In most cases where these machines are used, and especially in the manufacture of insulated wire, it is necessary to have the feed so arranged that it can be made to feed either fast or slow as the work may require; this may be accomplished by using a pair of friction cones in connection with the counter shaft, and by this means the feed can be run to suit the requirements.

WEIGHTS.

Size.	Rotary Straighteners.		Roll Straighteners	
	Net Weight.	Gross Weight.	Net Weight.	Gross Weight.
$\frac{1}{2}$ "	120 lbs.	200 lbs.	.....	.....
$\frac{3}{8}$ "	350 lbs.	475 lbs.	180 lbs.	230 lbs.
$\frac{1}{4}$ "	450 lbs.	520 lbs.	300 lbs.	415 lbs.
$\frac{3}{8}$ "	575 lbs.	675 lbs.	.....	.....
$\frac{1}{2}$ "	1,250 lbs.	1,300 lbs.	.....	.....

THE FAIRBANKS COMPANY

AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES.

LONG CUT MACHINE, STYLE A.

DESCRIPTION FIG. 11856.

The long cut machine, as its name implies, is designed for straightening wire and cutting it into long lengths. It can also be used for cutting any length shorter than the extreme length for which it is arranged, but is not recommended for continuous use in cutting short pieces.

This machine is constructed upon the same principle as the "medium cut" which is described under Fig. 11857, having the balance wheel and clutch attachment, and is also provided with a grooved guide bar and adjustable gauge to insure accurate lengths. Forked holders are employed in this machine to catch the wire as it is cut off and dropped from the groove in the guide bar. These holders are mounted upon a piece of wrought iron pipe which is fastened into the base of the machine at one end and at the other is supported by a floor stand. Some of the holders are carried up so as to support the shaft, guide bar and other necessary parts, thus rendering great security and strength to the various parts of the cutting extension.



FIG. 11856.

The engraving represents a machine with guide bar arranged to cut lengths of 8' and shorter, but we can furnish the machines to cut almost any length desired. This machine is built in the following sizes, viz.: $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", and $\frac{5}{8}$ "; each machine being capable of working many smaller diameters of wire than that indicated as its size, by having the necessary feeding and cutting tools.

There is included with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or labbit, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

The $\frac{3}{16}$ " machine is built in two lengths, viz.: to cut lengths up to 2' and to cut lengths up to 4'.

The $\frac{1}{4}$ " machine is built in five lengths, viz.: to cut lengths up to 2', 4', 6', 8' or 10'.

The $\frac{5}{16}$ " machine is built in five lengths, viz.: to cut lengths up to 2', 4', 6', 8' or 10'.

The $\frac{3}{8}$ " machine is built in four lengths, viz.: to cut lengths up to 4', 6', 8' or 10'.

The $\frac{1}{2}$ " machine is built in four lengths, viz.: to cut lengths up to 4', 6', 8' or 10'.

The $\frac{5}{8}$ " machine is built in four lengths, viz.: to cut lengths up to 4', 6', 8' or 10'.

The above are standard sizes, but machines can be built to cut longer lengths than listed if desired. Countershafts are furnished at extra cost only.

MEDIUM CUT MACHINE, STYLE A.

DESCRIPTION FIG. 11857.

The medium cut machine is designed to straighten wire, and to cut it up automatically into lengths of from 1' to 3' and shorter, according to the size of the machine.

In this machine, a shaft, about as long as the machine is intended to cut, is attached to the fulcrum of the cutting-off lever and rotates with each movement of the lever. The guide bar, situated above, and forward of this shaft, is connected with both the shaft and cutting-off lever and has a groove running its entire length in which is located a movable adjustable gauge; the gauge being connected at its outer end by a wire to a clutch on the cam shaft. When the straightened wire strikes this gauge, as it passes through the groove from the bushing die, it throws in the clutch, and the cutting-off lever works instantly; at the same time the rotary motion of the shaft throws the cover off the groove in the guide bar, by means of arms attached to it, and the cut wire drops out.

If straightened wire is run out too far without support, the end will drop out of line more or less according to the size of the wire, and if fed out by power against a stop gauge, it will either bend or spring before it can be cut off, and cannot, therefore, be cut into accurate lengths. The grooved guide bar with cover over these difficulties and is one of the important



FIG. 11857.

AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES.

DESCRIPTION FIG. 11857.—Continued.

The medium cut machine is built in the following sizes, viz.: $\frac{1}{8}$ " $\frac{3}{8}$ " $\frac{1}{2}$ " $\frac{5}{8}$ " and $\frac{3}{4}$ ", each machine being capable of working many smaller diameters of wire than that indicated as its size, by having the necessary feeding and cutting tools.

There is included with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or babbitt, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

LIST OF SIZES.

Size	$\frac{1}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{3}{4}$ "	$\frac{7}{8}$ "	$\frac{1}{2}$ "
	To cut lengths of 12" and shorter.	To cut lengths of 16" and shorter.	To cut lengths of 20" and shorter.	To cut lengths of 24" and shorter.	To cut lengths of 30" and shorter.	To cut lengths of 30" and shorter.	To cut lengths of 30" and shorter.

Note: Countershaft is furnished at extra cost only.

LONG CUT MACHINE, STYLE B.



FIG. 11858.

DESCRIPTION FIG. 11858.

The long cut machine is designed to automatically straighten and cut wire into long lengths. It can also be used for cutting shorter lengths than the capacity of the machine, but it is not recommended for continuous use in cutting short pieces.

In this machine, a shaft, about as long as the machine is intended to cut, is attached to the fulcrum of the cutting-off lever and rotates with each movement of the lever. The guide bar, situated above, and forward of this shaft, is connected with both the shaft and cutting-off lever and has a groove running its entire length in which is located a movable adjustable gauge; the gauge being connected at its outer end by a wire to a clutch on the cam shaft. When the straightened wire strikes this gauge, as it passes through the groove from the bushing guide, it throws in the clutch, and the cutting-off lever works instantly; at the same time the rotary motion of the shaft throws the cover off the groove in the guide bar, by means of arms attached to it, and the cut wire drops out.

Forked holders attached to a piece of wrought iron pipe extend upward and support the shaft, guide bar and other necessary parts, thereby forming a rigid extension.

In this machine are incorporated many important features of improvements, principally that the parts are made interchangeable and the arbor brackets detachable from the body of the machine, thus securing continuous running of the machine with the use of an extra arbor while the re-babbiting of an arbor is taking place.

The arbor is provided with a detachable cover and with flanges on the side of the pulley, which revolve in pockets containing waste which is renewed from time to time, thus preventing the oil, grit and scale from working into the driving belts, as in the former machine.

The arbor bracket is equipped with an oil box in which oily waste is placed and through which the wire passes before entering the straightener. The screws of the arbor bracket caps pass through the bracket and are checked by means of check nuts on the under side thereof, preventing them from loosening by reason of the high speed of the arbor.

The feed rolls are made double width and double grooved so that by reversing them a greater range of sizes of wire can be fed with one pair of rolls.

The friction on the cutting-off shaft is of such construction as to give the greatest possible wear and the general design of the machine is such as to occupy less floor space than formerly.

The machine is designed to handle $\frac{1}{8}$ " wire as the maximum size down to $\frac{1}{16}$ " as the minimum size. We furnish any size of arbor according to the requirements of customers.

There is included with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or babbitt, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

The $\frac{1}{8}$ " machine is built in lengths to cut up to 2', 3' or 4'.

The $\frac{3}{8}$ " machine is built in lengths to cut up to 2', 3', 4', 5', 6', 7', 8', 9' or 10'.

The $\frac{1}{2}$ " machine is built in lengths to cut up to 2', 3', 4', 5', 6', 7', 8', 9' or 10'.

The $\frac{5}{8}$ " machine is built in lengths to cut up to 3', 4', 5', 6', 7', 8', 9' or 10'.

Countershaft furnished at extra cost only.

THE FAIRBANKS COMPANY

AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES.

DESCRIPTION FIG. 11859.

The medium cut machine is designed to straighten and cut wire automatically into lengths of from 1' to 2' and shorter, according to the size of the machine.

In this machine, a shaft, about as long as the machine is intended to cut, is attached to the fulcrum of the cutting-off lever and rotates with each movement of the lever. The guide bar, situated above, and forward of this shaft, is connected with both the shaft and cutting-off lever and has a groove running its entire length in which is located a movable adjustable gauge; the gauge being connected at its outer end by a wire to a clutch on the cam shaft. When the straightened wire strikes this gauge, as it passes through the groove from the bushing die, it throws in the clutch, and the cutting-off lever works instantly; at the same time the rotary motion of the shaft throws the cover off the groove in the guide bar, by means of arms attached to it, and the cut wire drops out.

The machine is designed to handle $\frac{1}{8}$ " wire as the maximum, and down to $\frac{1}{16}$ " as the minimum. We furnish any size of arbor according to the requirements of customers.

The prices quoted herewith include with each machine a suitable reel for holding the coils of wire, a full set of dies for the straightener arbor (either white iron, gun metal or babbitt, as the wire to be worked may require), also one set of feeding and cutting tools which can be arranged to work from two to three consecutive sizes of wire within the capacity of the machine.

MEDIUM CUT MACHINE, STYLE B.



FIG. 11859.

LIST OF SIZES.

Size.....	$\frac{1}{16}$ "	$\frac{3}{16}$ "	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{3}{8}$ "
	To cut lengths of 12" and shorter.	To cut lengths of 16" and shorter.	To cut lengths of 20" and shorter.	To cut lengths of 24" and shorter.	To cut lengths of 24" and shorter.

Countershaft furnished at extra cost only.

ADJUSTABLE WIRE REELS.

HORIZONTAL REELS.



FIG. 11860.



FIG. 11861.

DESCRIPTION FIGS. 11860 AND 11861.

These reels are made in three sizes, as follows:

- No. 1, to take coils of wire up to about 30 lbs.
- No. 2, to take coils of wire up to about 60 lbs.
- No. 3, to take coils of wire up to about 100 lbs.

DESCRIPTION FIG. 11862.

These reels can be used either in vertical position or in horizontal position as shown. They are made in three sizes, viz.:

- No. 1, to take coils up to about 30 lbs.
- No. 2, up to about 60 lbs.
- No. 3, up to about 100 lbs.

COMBINATION VERTICAL AND HORIZONTAL REELS.



FIG. 11862.

MARKING MACHINES.

NO. 2 MARKING MACHINE.

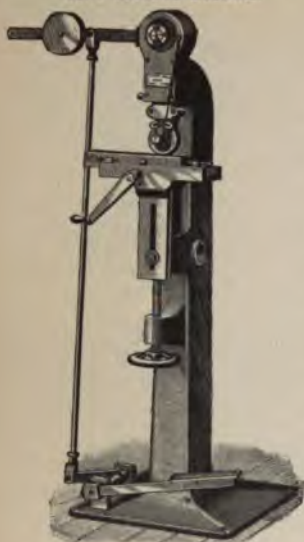


FIG. 11863.

DESCRIPTION FIG. 11864.

This machine is designed to mark by means of steel dies, letters, numbers, trade-marks, monograms, etc., on either flat or round metal surfaces, such as axes, pistol barrels, files, table cutlery, twist drills, taps, dies, reamers and a great variety of work.

The piece of work to be marked is held on table by suitable fixture. For marking flat surfaces a cylindrical die is used, and carried in a yoke or holder, which is attached to slide bar or rack, and which is moved by lever and pinion shown. By using a round die only a single point on the circumference of same is in contact with the work at one time. This process secures good work, and a saving of 50 to 75 per cent. in wear of dies. Many kinds of material that would be distorted by use of punch press can readily be marked. When marking round surfaces, as the shanks of drills and reamers, a flat die is attached to the rack or slide, and the work allowed to roll on table as the die comes in contact with it. It is practicable to mark hollow tubes. Adjustments are provided when using flat or round dies so that the proper character on die shall come in contact with work at stated point and by screw stops the amount of travel after contact is made is governed, and a clean cut beginning and ending of mark assured. The round die after use and release of pressure, is returned to first position by spring tension.

The height of table is adjustable by screw. As to capacity on both this and the No. 2 machine twist drills and taps are marked at rate of 12 to 20 per minute; table knives, 600 down in ten hours. Other work according to how easily it can be handled and set to the gauge pins. The finest work can be done with exactness. In ordering for special work we would suggest that the piece be sent to us, and suitable fixture for holding will be made or recommended. It can be adapted to a wide range of work, is mounted on column of convenient height, and is strong and well made. Weight, 375 lbs., which makes it convenient to move to different parts of the shop, if required there for use.

DESCRIPTION FIG. 11863.

The No. 2 machine is designed to mark long work, and also pieces that are got out to exact gauge as to thickness to the best advantage, fine adjustments for depth of mark provided.

The first of this style machine was built for the purpose of rolling on micro-center frames, the figures to express decimal equivalents.

The die is held in holder keyed to shaft. The shaft, as mark is made, revolves with the die, winding a spring tension, which, as soon as contact with work is broken, returns die to proper position to mark next piece. With the die holder is a segment adjustment by means of which the die shaft and die may be brought to right position to impress the first line or character squarely on work. The length of travel is regulated by stop screws on frame.

When flat work is to be marked a cylindrical die is used. To mark round work around the surface a flat faced die is used, and the round work is allowed to roll on table or fixture. Round work may be marked with single line lengthwise on crown, with one or two lines by a round die.

The table is adjustable as to height. The office of the foot lever on No. 2 machine is to raise the die from contact with work. By means of the sliding weight on arm any desired pressure may be applied to sink die in work. A stop with screw adjustment regulates the extreme drop of weighted arm. Where work is got out to gauge, the weight can be placed so as to insure a maximum travel of die, no more or no less, whether the face of die calls for power to impress one or five lines of lettering. By this means even impressions are secured.

The extreme travel of table as regularly built is 6". Distance from center of die to frame, 3½". The above dimensions may be altered at reasonable expense.

Our principle of bringing a slight line contact of die with work insures light wear on dies and makes it possible to mark hollow tubes, handle, chuck, and valve work which would not stand the blow of a punch or drop press.

Correspondence and sample of work solicited. Machine sent on approval to responsible parties.

NO. 3 MARKING MACHINE.



FIG. 11864.

WATER TOOL GRINDERS.

NOS. 1 AND 2 WATER TOOL GRINDERS.

DESCRIPTION FIGS. 11865 AND 11866.

NOS. 1 AND 2 WATER TOOL GRINDERS.



FIG. 11865.

Shows Bench Machine.

Illustrations show machines with tight and loose pulleys on spindle. Separate countershaft can be furnished, if desired.

The No. 1 machine is furnished with emery wheel, 10½" x 1".

The No. 2 machine is furnished with emery wheel 12" x 1½".

SPECIFICATIONS OF BENCH MACHINES.

	No. 1.	No. 2.
Bench room occupied.....	8" x 10"	10" x 13"
Height to center of arbor.....	8"	10"
Length of bearings.....	3"	3½"
Diameter of arbor through bearings....	1"	1"
Size of hole in wheel.....	1½"	1½"
Size of tight and loose pulleys on arbor. 4" x 2½"	5" x 2½"	
Speed, revolutions per minute.....	1,800	1,600
Weight of machine alone.....	65 lbs.	100 lbs.
Weight of machine, crated for shipment, about.....	80 lbs.	120 lbs.

The same size countershaft can be used for both the No. 1 and No. 2 machines. Specifications are as follows:

Driving pulley.....	14" x 2½"
Tight and loose pulleys.....	5" x 2½"
Diameter of shaft.....	1"
Length of shaft.....	15"
Drop of hanger.....	9"
Weight, net.....	50 lbs.
Weight, crated.....	60 lbs.

Floor stand for No. 1 machine weighs about 100 lbs.

Floor stand for No. 2 machine weighs about 125 lbs.



FIG. 11866.

Shows Machine on Floor Stand.

NOS. A AND B BENCH WATER TOOL GRINDERS.

DESCRIPTION FIG. 11867.

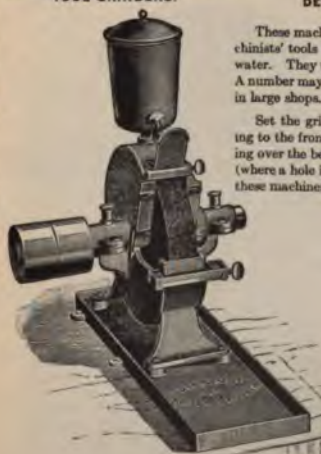


FIG. 11867.

These machines are designed for sharpening machinists' tools of all kinds, running emery wheels in water. They take up bench room of only 22" x 12". A number may be conveniently located on each floor in large shops.

Set the grinder on bench or stand, slightly sloping to the front, the front edge of the base projecting over the bench so the water will run to the front (where a hole is drilled) into a bucket furnished with these machines.

No. A bench tool grinding machine takes an emery wheel 10" x 1" x 1".

No. B bench tool grinding machine takes an emery wheel 10" x 2" x 1".

These machines are furnished with tight and loose or single pulleys. In ordering please state which is desired.

EXTRAS.

Column.—A cast iron column or floor stand can be supplied.

Countershaft.—A separate countershaft can be furnished. It should run about 475 revolutions per minute.

WEIGHTS.

No. 1 bench tool grinding machine, with column and countershaft...	240 lbs.
No. 2 bench tool grinding machine, with column and countershaft...	245 lbs.
No. 1 bench tool grinding machine only.....	70 lbs.
No. 2 bench tool grinding machine only.....	75 lbs.
Column only.....	130 lbs.
Countershaft only.....	40 lbs.

WATER TOOL GRINDERS.

20" WATER TOOL GRINDER.



FIG. 11868.

DESCRIPTION FIG. 11868.

Special attention is called to the water attachment on these grinders. It is entirely clear of the water in the tank.

There is no pump to cut out, get out of order or repack. No float to rust fast.

Water can be turned off or on instantly without effort or necessity on part of the operator of throwing weight of any part of the body against the machine.

It cannot leak and can be reached in a minute's time.

It distributes water evenly and does not deluge the operator.

The machines can be furnished with tight and loose pulleys on the spindle, as shown in cut, or with separate countershaft.

SPECIFICATIONS.

	No. 2.	No. 4.	No. 5.
Floor space occupied.....	14" x 20"	16" x 24"	18" x 28"
Height to top of rest.....	38"	39"	38"
Length of bearings.....	5"	6"	7"
Diameter of arbor through bearings.....	1 1/2"	1 5/8"	1 5/8"
Diameter of hole in wheel.....	1 1/2"	1 3/4"	1 5/8"
Size of tight and loose pulleys on arbor.....	5" x 3"	7" x 3"	7" x 4 1/4"
Size of wheel on machine as shown.....	16" x 2"	20" x 2 1/2"	24" x 3"
Speed, revolutions of wheel per minute.....	1,200	950	850
Tight and loose pulleys on countershaft.....	5" x 3 1/2"	7" x 4 1/4"	7" x 4 1/4"
Driving pulley on countershaft.....	14" x 3 1/4"	18" x 4 1/4"	18" x 4 1/4"
Weight of machine.....	500 lbs.	600 lbs.	900 lbs.
Weight of countershaft.....	75 lbs.	125 lbs.	150 lbs.
Weight of machine crated for shipment.....	650 lbs.	700 lbs.	1,100 lbs.
Weight of machine, including countershaft, crated for shipment, about.....	740 lbs.	850 lbs.	1,350 lbs.

DESCRIPTION FIG. 11868.

Water is applied to the wheel immediately in front of the tool ground; is under perfect control; is kept from the spindle and boxes by the hood and shield, and cannot escape from the pan to the floor.

A movable tank receives the water from the wheel and filters it.

This tank is easily removed for cleaning.

The filtered water only, passes to the pump reservoir.

Consequently no grit nor dirt in the pump.

Collars, steel spindle and pulleys are accurately turned, making a well-balanced smooth running machine.

Spindle boxes are self-oiling.

Machine is furnished either with or without the truing device shown in illustration.

SPECIFICATIONS.

	20"	30"
Size of base.....	17" x 19"	24" x 42"
Spindle pulley.....	6" x 3 1/2"	12" x 6 1/2"
Size of wheel.....	20" x 2 1/2"	30" x 4"
Countershaft tight and loose pulleys.....	8" x 4 1/2"	12" x 6"
Countershaft driving pulley.....	14" x 3 1/2"	18" x 5 1/2"
Speed of countershaft, revolutions.....	385	300
Weight, complete.....	800 lbs.	2,000 lbs.

NOS. 3, 4 AND 5 WATER TOOL GRINDERS.

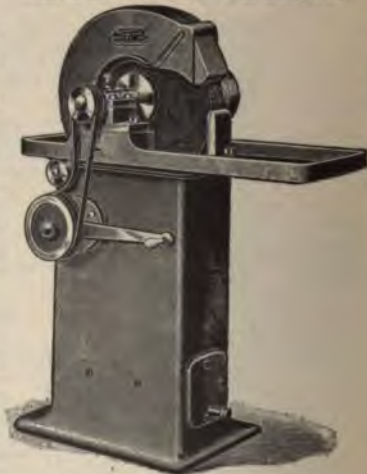


FIG. 11869.

KAYTHROO SHAYBETH

WATER TOOL GRINDERS.

DESCRIPTION FIG. 11870.

The above cut of the No. 2 tool grinding machine shows the general features of the improved Nos. 1, 2 and 3 machines. Particular attention is called to the pump, which is of new design, mechanically simple and powerful, with the least possible number of "wearing parts." These may be easily replaced, if necessary, at a trifling cost.

The machines are furnished with or without truing device, but we recommend the machines with truing device as being more economical, for the device is always ready for immediate use. The wheel may easily be kept in perfect condition, and the life of both machine and wheel is materially lengthened.

There is a single pulley on the spindle. The diameter of the spindle and the size of the bearings are larger than in earlier machines. The bearings are babbitted and on the No. 2 machine are provided with ring oilers.

NO. 1 IMPROVED TOOL GRINDING MACHINE.

This machine takes an emery wheel $14'' \times 2'' \times 1\frac{1}{2}''$

DIMENSIONS.

Size of base	18" x 25"
Height from floor to center of spindle	35"
Length of bearings, each	3"
Diameter of spindle in bearing	1\frac{1}{4}"
Size of pulley on spindle	5" x 3\frac{1}{2}"
Weight, machine and countershaft complete	435 lbs.
Weight, countershaft only	75 lbs.

Countershaft made for use with this machine has tight and loose pulleys $6'' \times 2\frac{3}{4}''$; driving pulley, $12'' \times 2\frac{3}{4}''$; drop of hanger, 8". It should run about 400 revolutions per minute.

NO. 2 IMPROVED TOOL GRINDING MACHINE.

This machine takes an emery wheel $20'' \times 2\frac{1}{2}'' \times 7''$.

DIMENSIONS.

Size of base	22" x 32"
Height from floor to center of spindle	36"
Length of bearings, each	7"
Diameter of spindle in bearing	1\frac{3}{4}"
Size of pulley on spindle	6" x 3\frac{1}{2}"
Weight, machine and countershaft complete	760 lbs.
Weight, countershaft only	110 lbs.

Countershaft made for use with this machine has tight and loose pulleys, $7'' \times 3\frac{1}{4}''$; driving pulley, $14'' \times 3\frac{1}{4}''$; drop of hanger, 10". It should run about 325 revolutions per minute.

20" IMPROVED WATER TOOL GRINDER WITH SELF-OILING BEARINGS.



FIG. 11871.

IMPROVED NOS. 1, 2 AND 3 TOOL GRINDING MACHINES.



FIG. 11870.

NO. 3 IMPROVED TOOL GRINDING MACHINE.

This machine takes an emery wheel $24'' \times 3\frac{1}{2}'' \times 10''$.

DIMENSIONS.

Size of base	24" x 35"
Height from floor to center of spindle	37"
Length of bearings, each	7"
Diameter of spindle in bearing	1\frac{3}{4}"
Size of pulley on spindle	10" x 5"
Weight, machine and countershaft complete	1,000 lbs.
Weight, countershaft only	160 lbs.

Countershaft made for use with this machine has tight and loose pulleys $10'' \times 5\frac{1}{4}''$; driving pulley, $16'' \times 5\frac{1}{4}''$; drop of hanger, 10". It should run about 350 revolutions per minute.

DESCRIPTION FIG. 11871.

Diameter of wheel, $20'' \times 2\frac{1}{2}''$ face.
 Spindle arbor bearings, $8'' \times 1\frac{3}{4}''$.
 Pulley on arbor, $6'' \times 4\frac{1}{4}''$.
 Countershaft tight and loose pulleys, $9'' \times 3\frac{1}{2}''$.
 Drive pulley on countershaft, $14\frac{1}{2}'' \times 4\frac{1}{2}''$.
 Speed of countershaft, 375 turns.
 Weight, complete, about 850 lbs.
 Size of base, $20'' \times 30''$.
 Floor space required, $28'' \times 40''$.

Countershaft and truing device are regularly furnished, but either or both may be omitted if not required.

WATER TOOL GRINDERS.

NOS. 4 AND 5 WATER TOOL GRINDER.



FIG. 11872.

DESCRIPTION FIGS. 11873 AND 11874.

The illustrations show the front and rear views of this machine. It is made in four sizes, and the dimensions correspond to those of out Nos. 2, 3, 4, and 5 tool grinders belted, shown in Figs. 11870 and 11872, except the necessary alterations required by change of power.

The motor, fully enclosed, is attached to the base, and the drive is accomplished by means of chain and sprocket wheels, which are protected by a shield. The motor is easily accessible, which is a great advantage if any repairs are necessary.

We furnish this machine either with or without motor.

APPROXIMATE WEIGHTS.

	No. 2.	No. 3.	No. 4.	No. 5.
Weight with motor...	1,085 lbs.	1,275 lbs.	2,100 lbs.	2,300 lbs.
Weight without motor	635 lbs.	825 lbs.	1,650 lbs.	1,850 lbs.

DESCRIPTION FIG. 11872.

NO. 4 TOOL GRINDING MACHINE.

This machine takes an emery wheel 30" x 4" x 16".

DIMENSIONS.

Size of base.....	28" x 45"
Height from floor to center of spindle.....	37"
Size of pulley on spindle.....	14" x 6"
Weight, machine and countershaft complete....	1,500 lbs.

Countershaft made for use with this machine has tight and loose pulleys 10" x 6", driving pulley 18" x 6"; drop of hanger 12". It should run about 350 revolutions per minute.

NO. 5 TOOL GRINDING MACHINE.

This machine takes an emery wheel 36" x 4" x 21".

DIMENSIONS.

Size of base.....	28" x 51"
Height from floor to center of spindle.....	37"
Size of pulley on spindle.....	14" x 6"
Weight, machine and countershaft complete....	2,100 lbs.

Countershaft made for use with this machine has tight and loose pulleys 10" x 6", driving pulley 18" x 6"; drop of hangers 12". It should run about 300 revolutions per minute.

MOTOR DRIVEN WATER TOOL GRINDER.



FIG. 11873.

WATER TOOL GRINDERS.

MOTOR-DRIVEN WATER TOOL GRINDER.

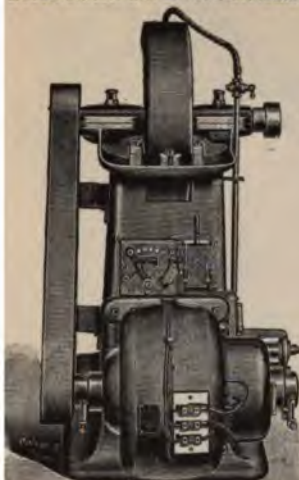


FIG. 11874.

Description on preceding page.

DESCRIPTION FIG. 11876.

The cut represents Nos. 3, 7, and 8 models. They are arranged with emery wheels (often ordered with coarse and one medium fine), and particularly adapted where large small tools are used. When desired furnish tight and loose pulleys and lifting device on the emery wheel die at extra cost.

NUMBER OF MACHINES	3	7
Weight of machine.....	1,800 lbs.	2,200 lbs.
Clear space.....	34" x 33"	38" x 33"
Dist to center of spindle.....	28"	30"
Dist of bearings.....	8"	8"
Diameter of spindle.....	2"	2 1/4"
Dist of spindle pulley.....	8" x 8"	8" x 8"
Dist of counter drive pulley.....	16" x 8"	16" x 5"
Dist of counter tight and loose pulley.....	9" x 4"	10" x 8"
Dist of emery wheel.....	20" x 3"	20" x 3"
Speed of counter.....	350 revs.	300 revs.
Speed of emery wheel.....	700 revs.	600 revs.

NUMBER OF MACHINES	8
Weight of machine.....	2,200 lbs.
Clear space.....	36" x 48"
Dist to center of spindle.....	30"
Dist of bearings.....	8"
Diameter of spindle.....	2 1/4"
Dist of spindle pulley.....	12" x 12"
Dist of counter drive pulley.....	18" x 15"
Dist of counter tight and loose pulley.....	17" x 15"
Dist of emery wheel.....	36" x 4"
Speed of counter.....	280 revs.
Speed of emery wheel.....	400 revs.

MOTOR-DRIVEN WET TOOL GRINDER WITH SELF-OILING BEARINGS.



FIG. 11875.

DESCRIPTION FIG. 11875.

This machine will carry a wheel 20" x 2 1/4" and is of the same general construction as grinder shown in Fig. 11871, but fitted with electric motor.

DOUBLE WATER TOOL GRINDER.

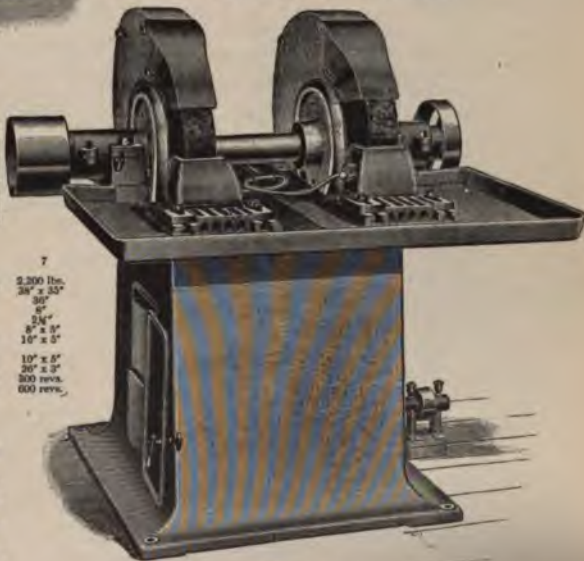


FIG. 11876.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11877.

This grinder will sharpen drills from the smallest size up to $\frac{3}{8}$ " diameter. It can be furnished to mount on bench, or with floor stand. Illustration shows machine to be driven by belt. We can, however, furnish the same machine to operate by hand power.

The No. 2 $\frac{1}{2}$ machine is similar to the No. 2 but larger, having capacity for sharpening drills from No. 70 up to $\frac{1}{2}$ ".



STYLE K BENCH DRILL GRINDER.

FIG. 11878.

DESCRIPTION FIG. 11879.

Capacity, $\frac{3}{8}$ " to $1\frac{1}{4}$ " drills.
 Diameter of emery wheel, 7".
 Speed of emery wheel, 2,640 revolutions per minute.
 Speed of countershaft, 550 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{2}$ " x $1\frac{1}{4}$ ".
 Driving pulley, 12 " x $1\frac{1}{4}$ ".

STYLE L BENCH DRILL GRINDER.



FIG. 11879.



NO. 2 IDEAL DRILL GRINDER.

FIG. 11877.

NO. 3 IDEAL DRILL GRINDER.

Tight and loose pulleys, 6 " x $1\frac{1}{4}$ ".
 Height to center of spindle, 14 ".
 Bench space occupied, 1 ' square.
 Weight, net, 100 lbs.
 Weight, crated, 130 lbs.
 Weight, boxed, 150 lbs.
 Cubic feet boxed, 5 .

DESCRIPTION FIG. 11879.

Capacity, No. 60 to $\frac{5}{8}$ " drills.
 Diameter of emery wheel, 5 ".
 Speed of emery wheel, $2,880$ revolutions per minute.
 Speed of countershaft, 600 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{2}$ " x $1\frac{1}{4}$ ".
 Driving pulley, 12 " x $1\frac{1}{4}$ ".
 Tight and loose pulleys, 6 " x $1\frac{1}{4}$ ".
 Height to center of spindle, 14 ".
 Bench space occupied, 1 ' square.
 Weight, net, 95 lbs.
 Weight, crated, 115 lbs.
 Weight, boxed, 135 lbs.
 Cubic feet boxed, $4\frac{1}{2}$.

DESCRIPTION FIG. 11880.

The No. 3 grinder has capacity for sharpening drills from $\frac{3}{4}$ " to $1\frac{1}{2}$ " inclusive. It is furnished complete with stand on countershaft. Speed of countershaft, 375 revolutions per minute. Weight, 170 lbs.



FIG. 11880.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11881.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}$ ".
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 530 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $12" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $6" \times 2\frac{1}{4}"$.
 Height to center of spindle, 13".
 Bench space occupied, 1' square.
 Weight, net, 145 lbs.
 Weight, crated, 170 lbs.
 Weight, boxed, 195 lbs.
 Cubic feet boxed, 6.

STYLE M BENCH DRILL GRINDER.



FIG. 11881.

STYLE J DRILL GRINDER.



FIG. 11882.

DESCRIPTION FIG. 11882.

Capacity, $\frac{3}{8}$ " to $1\frac{1}{4}$ " drills.
 Diameter of emery wheel, 7".
 Speed of emery wheel, 2,640 revolutions per minute.
 Speed of countershaft, 550 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{4}" \times 1\frac{1}{4}"$. Driving pulley, $12" \times 1\frac{1}{4}"$.
 Tight and loose pulleys, $6" \times 1\frac{1}{4}"$.
 Height to center of spindle, $45\frac{1}{2}"$.
 Floor space occupied, $1\frac{1}{4}" \times 2\frac{1}{4}"$.
 Weight, net, 140 lbs.
 Weight, crated, 165 lbs.
 Weight, boxed, 205 lbs.
 Cubic feet boxed, 10.

STYLE C DRILL GRINDER.



FIG. 11883.

DESCRIPTION FIG. 11883.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}"$.
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 425 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $15" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $7\frac{1}{2}" \times 2\frac{1}{4}"$.
 Height to center of spindle, $42"$.
 Floor space occupied, $1\frac{1}{2}" \times 3'$.
 Weight, net, 235 lbs.
 Weight, crated, 260 lbs.
 Weight, boxed, 315 lbs.
 Cubic feet, boxed, 12.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11677.

This grinder will sharpen drills from the smallest size up to $\frac{5}{8}$ " diameter. It can be furnished to mount on bench, or with floor stand. Illustration shows machine to be driven by belt. We can, however, furnish the same machine to operate by hand power.

The No. 2 $\frac{1}{2}$ machine is similar to the No. 2 but larger, having capacity for sharpening drills from No. 70 up to $\frac{1}{2}$ ".



FIG. 11676.

DESCRIPTION FIG. 11676.

Capacity, $\frac{3}{8}$ " to $1\frac{1}{4}$ " drills.
 Diameter of emery wheel, 7".
 Speed of emery wheel, 2,640 revolutions per minute.
 Speed of countershaft, 550 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{2}$ " x $1\frac{1}{4}$ ".
 Driving pulley, 12 " x $1\frac{1}{4}$ ".

STYLE L BENCH DRILL GRINDER.



FIG. 11679.



NO. 2 IDEAL DRILL GRINDER.

FIG. 11677.

NO. 3 IDEAL DRILL GRINDER.



FIG. 11680.

DESCRIPTION FIG. 11679.

Capacity, No. 60 to $\frac{5}{8}$ " drills.
 Diameter of emery wheel, 5".
 Speed of emery wheel, 2,880 revolutions per minute.
 Speed of countershaft, 600 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{2}$ " x $1\frac{1}{4}$ ".
 Driving pulley, 12 " x $1\frac{1}{4}$ ".
 Tight and loose pulleys, 6 " x $1\frac{1}{4}$ ".
 Height to center of spindle, 14".
 Bench space occupied, 1' square.
 Weight, net, 95 lbs.
 Weight, crated, 115 lbs.
 Weight, boxed, 135 lbs.
 Cubic feet boxed, 4 $\frac{3}{4}$.

DESCRIPTION FIG. 11680.

The No. 3 grinder has capacity for sharpening drills from $\frac{3}{4}$ " to $1\frac{1}{2}$ " inclusive. It is furnished complete with stand on countershaft. Speed of countershaft, 375 revolutions per minute. Weight, 170 lbs.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11881.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}$ ".
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 530 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $12" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $6" \times 2\frac{1}{4}"$.
 Height to center of spindle, 13".
 Bench space occupied, 1' square.
 Weight, net, 145 lbs.
 Weight, crated, 170 lbs.
 Weight, boxed, 195 lbs.
 Cubic feet boxed, 6.

STYLE M BENCH DRILL GRINDER.

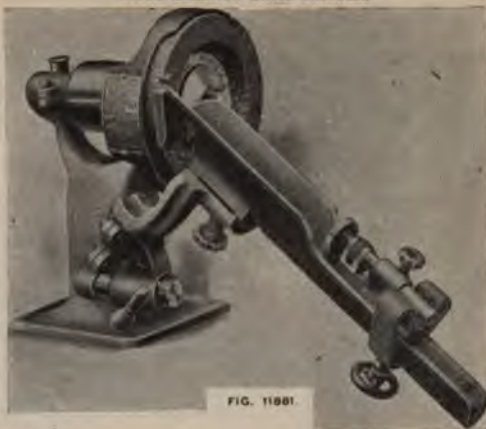


FIG. 11881.

STYLE J DRILL GRINDER.



FIG. 11882.

DESCRIPTION FIG. 11882.

Capacity, $\frac{3}{8}$ " to $1\frac{1}{4}$ " drills.
 Diameter of emery wheel, 7".
 Speed of emery wheel, 2,640 revolutions per minute.
 Speed of countershaft, 550 revolutions per minute.
 Pulley on wheel spindle, $2\frac{1}{2}" \times 1\frac{1}{4}"$. Driving pulley, $12" \times 1\frac{1}{4}"$.
 Tight and loose pulleys, $6" \times 1\frac{1}{4}"$.
 Height to center of spindle, $45\frac{1}{2}"$.
 Floor space occupied, $1\frac{1}{4}' \times 2\frac{1}{2}'$.
 Weight, net, 140 lbs.
 Weight, crated, 165 lbs.
 Weight, boxed, 205 lbs.
 Cubic feet boxed, 10.

STYLE C DRILL GRINDER.



FIG. 11883.

DESCRIPTION FIG. 11883.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}"$.
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 425 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $15" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $7\frac{1}{2}" \times 2\frac{1}{4}"$.
 Height to center of spindle, 42".
 Floor space occupied, $1\frac{1}{2}' \times 3'$.
 Weight, net, 225 lbs.
 Weight, crated, 260 lbs.
 Weight, boxed, 315 lbs.
 Cubic feet, boxed, 12.

TWIST DRILL GRINDERS.

STYLE A DRILL GRINDER.



FIG. 11884.

DESCRIPTION FIG. 11884.

A capacity sufficient for nearly all shops, a form self-contained and easy to install and accessibility of the countershaft for oiling combine to make this a desirable machine. A liberally large emery wheel, with corresponding low speed and rigid, well-proportioned design prevent vibration and render the machine very long-lived.

Capacity, $\frac{1}{8}$ " to $2\frac{3}{4}$ " drills.
Diameter of emery wheel, $9\frac{1}{2}$ ".
Speed of emery wheel, 1,600 revolutions per minute.
Speed of countershaft, 425 revolutions per minute.
Pulley on wheel spindle, $4" \times 2\frac{3}{4}"$.
Driving pulley, $15" \times 2\frac{3}{4}"$.

Tight and loose pulleys, $7\frac{1}{2}" \times 2\frac{3}{4}"$.
Height to center of spindle, $42"$.
Floor space occupied, $1\frac{1}{2}' \times 3'$.
Weight, net, 215 lbs.
Weight, crated, 250 lbs.
Weight, boxed, 205 lbs.
Cubic feet boxed, 12.

DESCRIPTION FIG. 11885.

This machine, having its countershaft overhead, can be placed at a distance from the line shaft, which cannot well be done with the self-contained type. The countershaft, being self-contained, is easily put up; the loose pulley is oiled through the hollow shaft, and the belt-shifting device is simple and convenient.

SPECIFICATIONS FIG. 11885.

Capacity, $\frac{1}{8}$ " to $2\frac{3}{4}$ " drills.
Diameter of emery wheel, $9\frac{1}{2}"$.
Speed of emery wheel, 1,600 revolutions per minute.
Speed of countershaft, 530 revolutions per minute.
Pulley on wheel spindle, $4" \times 2\frac{3}{4}"$.
Driving pulley, $12" \times 2\frac{3}{4}"$.

Tight and loose pulleys, $6" \times 2\frac{3}{4}"$.
Height to center of spindle, $42"$.
Floor space occupied, $1\frac{1}{2}' \times 3'$.
Weight, net, 230 lbs.
Weight, crated, 265 lbs.
Weight, boxed, 325 lbs.
Cubic feet boxed, 13.

POINT THINNING ATTACHMENT.

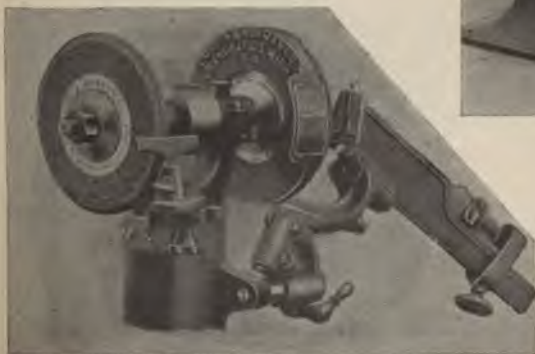


FIG. 11886.



STYLE B DRILL GRINDER.

FIG. 11885.

Shows machine with countershaft.

DESCRIPTION FIG. 11886.

This attachment consists of a bevel faced emery wheel $10' \times \frac{1}{2}"$ mounted on opposite end of spindle from the regular wheel. It is used for thinning the points of drills and can be furnished on either the style A or style B drill grinders.

STYLE CTA DRILL GRINDER.



FIG. 11867.

DESCRIPTION FIG. 11869.

This machine is the same as style CTA, but is fitted with electric motor drive instead of countershaft. In making inquiry for machine of this description, advise as the nature of electric current on which motor will operate. Weight (approximate), net, 230 lbs.; crated 270 lbs.; boxed, 330 lbs.

STYLE ATA DRILL GRINDER.



FIG. 11889.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11867.

This grinder has capacity for sharpening drills from 1/4" to 2 1/4" diameter. Countershaft is contained in the base of the machine and has tight and loose pulleys which should run 350 revolutions per minute.

The thinning attachment shown in cut forms part of the regular equipment, but may be omitted if not required.

Weight, net, 170 lbs.; crated, 210 lbs.; boxed, 270 lbs.

DESCRIPTION FIG. 11868.

This machine is the same as the CTA machine, except that the countershaft, instead of being incorporated in the base of the grinder, is separate so that it can be put up overhead.

Countershaft pulleys are 6" diameter and should run 350 revolutions per minute.

Weight, net, 190 lbs.; crated, 230 lbs.; boxed, 300 lbs.

STYLE BTA DRILL GRINDER.



FIG. 11888.

DESCRIPTION FIG. 11889.

Same as style BTA, but without column, making a convenient bench machine. Weight with countershaft, net, 115 lbs.; crated, 130 lbs.; boxed, 165 lbs.

STYLE ETA DRILL GRINDER.

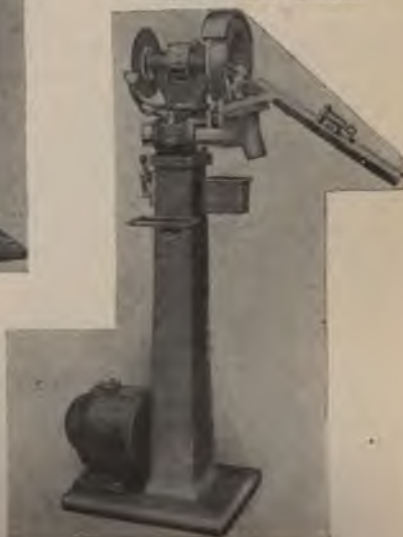


FIG. 11890.

TWIST DRILL GRINDERS.



FIG. 11891.

STYLE D DRILL GRINDER, MOTOR DRIVEN.

DESCRIPTION FIG. 11891.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}$ ".
 Speed of emery wheel, 1,600 revolutions per minute.
 Height to center of spindle, 43".
 Floor space occupied, $13\frac{1}{2}$ ' x 3'.
 Weight, net, 375 lbs.
 Weight, crated, 435 lbs.
 Weight, boxed, 520 lbs.
 Cubic feet boxed, 14.

Motor is wound for either 110 or 220 volt direct current. If wanted for any other current, there is an extra charge for special motor.

DESCRIPTION FIG. 11892.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}$ ".
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 425 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $15" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $7\frac{1}{2}" \times 2\frac{1}{4}"$.
 Height to center of spindle, 43".
 Floor space occupied, 2' x 3'.
 Weight, net, 325 lbs.
 Weight, crated, 380 lbs.
 Weight, boxed, 450 lbs.
 Cubic feet boxed, $16\frac{1}{2}$.

STYLE P WET DRILL GRINDER.



FIG. 11892.

STYLE P0 WET DRILL GRINDER.



FIG. 11893.

DESCRIPTION FIG. 11893.

It will be noted that the main difference between style P and this machine is the separate countershaft.

Besides enabling the machine to be placed at a distance from the line shaft this has the advantage that in the combination machines the tight and loose pulleys or the belt are not in the way when the rear end of the machine is being used. In all other respects it closely resembles style P.

Capacity, $\frac{1}{8}$ " to $2\frac{1}{4}$ " drills.
 Diameter of emery wheel, $9\frac{1}{2}$ ".
 Speed of emery wheel, 1,600 revolutions per minute.
 Speed of countershaft, 530 revolutions per minute.
 Pulley on wheel spindle, $4" \times 2\frac{1}{4}"$.
 Driving pulley, $12" \times 2\frac{1}{4}"$.
 Tight and loose pulleys, $6" \times 2\frac{1}{4}"$.
 Height to center of spindle, 43".
 Floor space occupied, $13\frac{1}{2}$ ' x 3'.
 Weight, net, 350 lbs.
 Weight, crated, 415 lbs.
 Weight, boxed, 490 lbs.
 Cubic feet boxed, 17.

TWIST DRILL GRINDERS.

DESCRIPTION FIG. 11894.

This grinder is made in two sizes, one having capacity for sharpening drills up to 2½", the other up to 3½". The point thinning attachment may be omitted if not desired.

SPECIFICATIONS.

Style.	Capacity	Net Weight.	Gross Weight Crated.	Gross Weight Boxed.	Speed of Counter-shaft, R. P. M.	Dis. T. & I. Pulleys of Counter-shaft.
WTA	½"-2½"	305 lbs.	400 lbs.	480 lbs.	425	8"
WTAL	1"-3½"	315 lbs.	410 lbs.	490 lbs.	425	8"
WTAF	½"-3½"	325 lbs.	420 lbs.	500 lbs.	425	8"

STYLE WTA
WET DRILL
GRINDER.



FIG. 11894.

NO. 1 AND NO. 00 WET DRILL GRINDERS.



FIG. 11895.

DESCRIPTION FIG. 11895.

The drill to be ground is held with its point lower than its shank. This allows us to apply the water to the drill itself, flooding the point, instead of applying it to the wheel in the old way. The advantages of this are apparent. The old way causes the water to acquire the velocity of the rapidly revolving wheel, consequently when the drill is brought in contact with this wet surface the water is deflected in all directions much to the discomfort of the operator. By applying the water first to the inverted drill, it gets only the velocity acquired in falling. The drill holder causes it to back up about the point of the drill, at times actually submerging the parts which are being ground. When it reaches the wheel the velocity of the water is so low, compared with that of the wheel itself, that it is neatly picked up by the wheel and carried away without slop or spatter. Mechanics who have experienced the annoyance of the wet tool grinding will appreciate this. Perhaps the most striking feature of this drill grinder is that which causes the water to automatically flow to the drill in a continuous stream without the use of a pump with its troublesome stuffing-boxes and complicated connections. The water when picked up by the grinding wheel as above described is thrown by centrifugal force into a reservoir from which it is conducted again to the drill. The lower part of this reservoir forms an ample settling chamber. The grinding wheel is never submerged, and when not in motion the wheel is not even in contact with the water.

No. 1 machine grinds drills from ½" to 2½"
No. 00 machine grinds drills from ¼" to 4"

DESCRIPTION FIG. 11896.

The pump is liberally designed and supplies a large amount of water, which is applied to the wheel just above the drill and prevents overheating even when grinding heavily. The water, upon returning to the tank, first enters a settling basin, where the grindings remain, leaving it clean as it again enters the pump chamber.

Capacity, ¼" to 3½" drills.
Diameter of emery wheel, 12".
Speed of emery wheel, 1,240 revolutions per minute.
Speed of countershaft, 425 revolutions per minute.
Pulley on wheel spindle, 4½" x 2½".
Driving pulley, 14" x 2¾".

Tight and loose pulleys, 9" x 3¼".
Height to center of spindle, 43½".
Floor space occupied, 2' x 3'.
Weight, net, 490 lbs.
Weight, crated, 565 lbs.
Weight, boxed, 645 lbs.
Cubic feet boxed, 24.

STYLE F WET DRILL GRINDER.



FIG. 11896.



TWIST DRILL GRINDERS.

STYLE G WET DRILL GRINDER.



FIG. 11897.

DESCRIPTION FIG. 11897.

Style G is the largest drill grinder made. Its design and weight are in keeping with the weight of the drills and three and four groove chucking reamers ground on it. A 4 1/2" three-groove reamer is shown in the holder.

Capacity, 1" to 5" drills. Tight and loose pulleys, 12" x 3 3/4".
 Diameter of emery wheel, 20" x 3 3/4".
 Speed of emery wheel, 720 Height to center of spindle, 42".
 revolutions per minute.
 Speed of countershaft, 300 Floor space occupied, 2' x 4 1/2".
 revolutions per minute. Weight, net, 860 lbs.
 Pulley on wheel spindle, 5" Weight, crated, 960 lbs.
 x 3 3/4". Weight, boxed, 1,080 lbs.
 Driving pulley, 12" x 3 3/4". Cubic feet boxed, 30.

STYLE EWTA MOTOR DRIVEN WET DRILL GRINDER

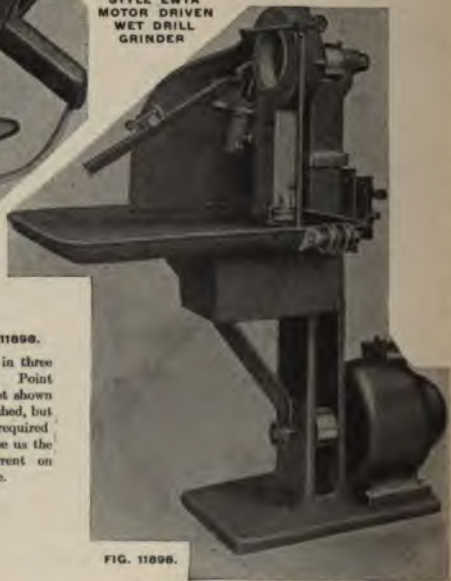


FIG. 11898.

STYLE N MOTOR-DRIVEN WET DRILL GRINDER.

DESCRIPTION FIG. 11899.

This machine is built in three sizes as noted below. Point thinning attachment (not shown in cut) is regularly furnished, but may be omitted if not required. In making inquiry, advise us the nature of electric current on which motor is to operate.



FIG. 11899.

SPECIFICATIONS.

Style.	Capacity.	Net Weight.	Gross Weight Crated.	Gross Weight Boxed.
EWTA	1 1/2"-2 1/4"	430 lbs.	540 lbs.	630 lbs.
EWTA L	1"-3 1/2"	440 lbs.	550 lbs.	640 lbs.
EWTA F	1 1/2"-3 1/2"	450 lbs.	560 lbs.	650 lbs.

Speed of grinding wheel, about 1,700 revolutions per minute.

DESCRIPTION FIG. 11899.

Of all electrically driven tools these are the simplest. The wheel being carried on the motor shaft, there is but one revolving part.

The motor is fully enclosed and protected against dirt or injury; the bearings are ring-oiled and its field is cast integral with the column, which contains the starting box.

All these features combine to produce the neat, well-proportioned machines shown. Standard machines are provided with motors wound for either 110 or 220 volts direct current, but machines can be fitted specially with motors for other currents.

Capacity, 1 1/4" to 3 1/2" drills. Floor space occupied, 2' x 2'.
 Diameter of emery wheel, 12". Weight, net, 565 lbs.
 Speed of emery wheel, 1,240 revolutions Weight, crated, 630 lbs.
 per minute. Weight, boxed, 710 lbs.
 Height of center to spindle, 43". Cubic feet 10

KAY P M O O B N N V E R T F E H T

KNIFE GRINDERS.

AUTOMATIC PLANER KNIFE GRINDER.

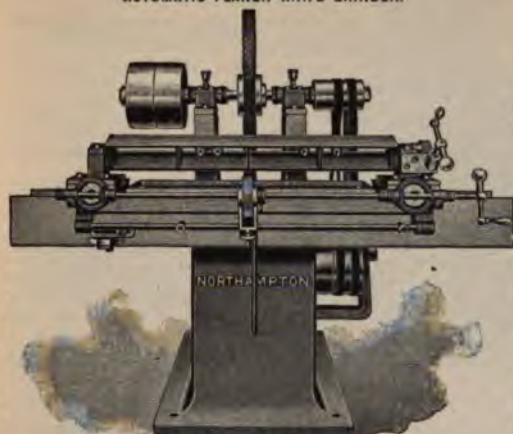


FIG. 11900.

DESCRIPTION FIGS. 11900 AND 11901.

Carries emery wheel 26" in diameter, 1½" thick. We build this style machine in sizes to grind knives of any length up to 52", to run either wet or dry.

DIMENSIONS OF 30" MACHINE.

Size of base on floor.....	24" x 30"
Height to center of arbor.....	42"
Length of bearings.....	7"
Diameter of arbor through bearings...	1½"
Diameter of arbor between bearings..	1½"
Size of hole in emery wheel.....	2½"
Size of tight and loose pulleys on arbor.	10" x 4"
Speed of machine, revolutions per minute.....	600 to 650
Speed of carriage, per minute.....	30'
Automatic feed of knife up to wheel...	rrrs"

AUTOMATIC PLANER KNIFE GRINDER.

Equipped with full automatic attachment and with waterhood and pump.

SPECIFICATIONS FIG. 11901.

Size.	Weight of Machine Alone.	Weight Crated, About.
30" machine ...	1,200 lbs.	1,450 lbs.
36" machine ...	1,400 lbs.	1,650 lbs.
42" machine ...	1,600 lbs.	1,850 lbs.
48" machine ...	1,800 lbs.	2,000 lbs.
52" machine ...	2,000 lbs.	2,250 lbs.

Automatic attachment for feed of knife up to wheel, waterhood and pump, for wet grinding are furnished at additional cost only.



FIG. 11901.

KNIFE GRINDERS.

AUTOMATIC PLANER KNIFE GRINDER.



FIG. 11900.

DESCRIPTION FIGS. 11900 AND 11901.

Carries emery wheel 26" in diameter, 1 1/2" thick.
We build this style machine in sizes to grind knives of any length up to 52", to run either wet or dry.

DIMENSIONS OF 30" MACHINE.

Size of base on floor.....	24" x 30"
Height to center of arbor.....	42"
Length of bearings.....	7"
Diameter of arbor through bearings..	1 1/2"
Diameter of arbor between bearings..	1 1/2"
Size of hole in emery wheel.....	2 1/2"
Size of tight and loose pulleys on arbor.	10" x 4"
Speed of machine, revolutions per minute.....	600 to 650
Speed of carriage, per minute.....	30"
Automatic feed of knife up to wheel... ..	1 1/2"

AUTOMATIC PLANER KNIFE GRINDER.

Equipped with full automatic attachment and with waterhood and pump.

SPECIFICATIONS FIG. 11901.

Size.	Weight of Machine Alone.	Weight Crated, About.
30" machine . . .	1,200 lbs.	1,450 lbs.
36" machine . . .	1,400 lbs.	1,650 lbs.
42" machine . . .	1,600 lbs.	1,850 lbs.
48" machine . . .	1,800 lbs.	2,000 lbs.
52" machine . . .	2,000 lbs.	2,250 lbs.

Automatic attachment for feed of knife up to wheel, waterhood and pump, for wet grinding are furnished at additional cost only.



FIG. 11901.

KNIFE GRINDERS.

DISK WHEEL AUTOMATIC KNIFE GRINDER.



FIG. 11902.

The bar on which the knife is clamped is strong and is so arranged that the wheel will grind toward the edge, or the bar may be reversed, and the knife ground toward the butt. Each end of the knife may be moved to or from the wheel by small hand screws. By this device the edge of the knife may be brought perfectly parallel to the guides on which the platen travels; after which the emery wheel is brought to the knife by the hand wheel. The knife bar is rotated by a worm gear shown at the left-hand side of the bar and may be rigidly clamped when the setting is obtained. This allows grinding the edge of the knife to the desired level, as the knife may be set at any angle with the wheel.

WEIGHTS.

26" machine complete, shipping weight, about.....	2,200 lbs.
30" machine complete, shipping weight, about.....	2,400 lbs.
36" machine complete, shipping weight, about.....	2,500 lbs.
42" machine complete, shipping weight, about.....	2,600 lbs.
48" machine complete, shipping weight, about.....	2,800 lbs.

COUNTERSHAFT.

The countershaft for this machine has tight and loose pulleys 9" x 4 1/4"; driving pulley, 13" x 4 1/4"; drop of hangers, 10", and speed run about 325 revolutions per minute.

DESCRIPTION FIG. 11903.

This machine is designed especially for grinding and facing long knives. It may also be used for grinding flat surfaces up to 6" in width.

It is substantially built, the sizes from 120" to 180" being constructed heavier throughout and furnished with 18" cylindrical wheels. Sizes up to 114" are furnished with 14" cup wheels.

This machine is made in two styles, either with a disk wheel or with a cylinder wheel, and in sizes to grind knives from 24" to 180" in length.

For flat and concave grinding, the machine with cup wheel can be fitted with a swivel head.

It is provided with a pump which takes filtered water from an iron pan and applies it to the work in such quantities as to prevent heating.

The wheel spindles are large and run in self-oiling boxes. A double train of spur gears, and rack cut from solid steel, furnish the driving mechanism. The wheel head bracket is supported by a square leg, which also serves as a reservoir to supply the pump.

We call your attention to the automatic adjustable feed on this knife grinder. It is obtained by feeding the wheel head to the work.

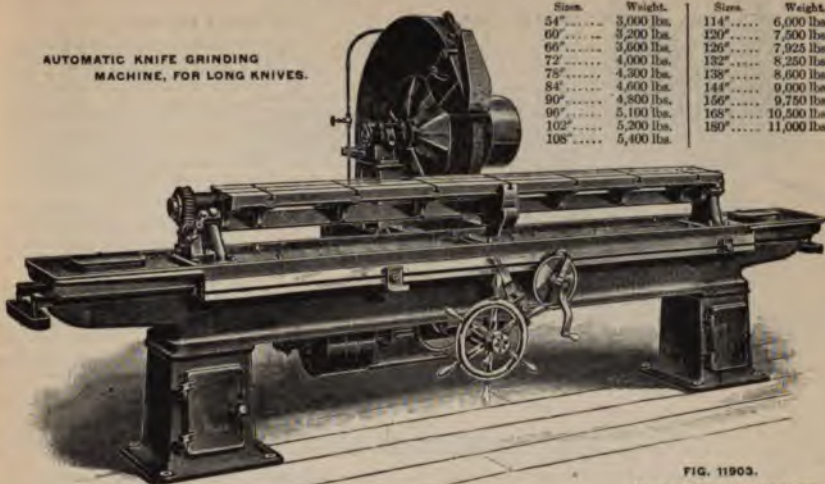
When the pawl takes one tooth of the ratchet, the distance between the wheel and the work will be varied by .0001". This method of cross feed makes it possible for the knife bar to be rigidly attached to the carriage, and allows the bar to be braced by center bearings. By this construction accurate work and best results are insured, and the knives are prevented from being ground winding.

This knife grinder can be furnished with an independent six-jawed chuck to carry a cup wheel of 30" in diameter.

The machine with disk wheel is usually furnished with a 26" wheel.

KNIFE GRINDERS.

AUTOMATIC KNIFE GRINDING MACHINE, FOR LONG KNIVES.



Size.	Weight.	Size.	Weight.
54".....	3,000 lbs.	114".....	6,000 lbs.
60".....	3,200 lbs.	120".....	7,500 lbs.
66".....	3,600 lbs.	126".....	7,925 lbs.
72".....	4,000 lbs.	132".....	8,250 lbs.
78".....	4,300 lbs.	138".....	8,600 lbs.
84".....	4,600 lbs.	144".....	9,000 lbs.
90".....	4,800 lbs.	150".....	9,750 lbs.
96".....	5,100 lbs.	168".....	10,500 lbs.
102".....	5,200 lbs.	180".....	11,000 lbs.
108".....	5,400 lbs.		

FIG. 11903.

Description on preceding page.

AUTOMATIC PLANER KNIFE GRINDER WITH CUP WHEEL.



DESCRIPTION FIG. 11904.

Carries 9" x 4" Cup Wheel.

Automatic attachment for feed of knife up to wheel water hood and pump, for wet grinding, are furnished at extra cost.

SPECIFICATIONS FIG. 11904.

Size	Weight of Machine Alone.	Weight Crated, About.
30".....	850 lbs.	1,050 lbs.
36".....	950 lbs.	1,150 lbs.
42".....	1,050 lbs.	1,300 lbs.
48".....	1,250 lbs.	1,500 lbs.

FIG. 11904.

DIMENSIONS OF 30" MACHINE.

Size of base on floor.....	22" x 22"
Height to center of arbor.....	35"
Length of bearings.....	5"
Diameter of arbor through bearings.....	1 1/2"
Diameter of arbor between bearings.....	1 3/4"

Size of hole in cup wheel.....	3 1/2"
Size of tight and loose pulleys on arbor.....	5" x 3"
Speed of machine, revolutions per minute.....	800
Speed of carriage, per minute.....	30"
Automatic feed of knife up to wheel.....	1/8"

KNIFE GRINDERS.

CYLINDER WHEEL AUTOMATIC KNIFE GRINDER.



FIG. 11905.

knife by the hand wheel. The knife bar is rotated by a worm gear shown at the left-hand side of the bar and may be rigidly clamped to the wheel. This allows grinding the edge of the knife to the desired bevel, as the knife may be set at any angle with the wheel.

We strongly advise the use of our adjustable cylinder wheel holder, so that a thin wheel may be used, which cuts faster than a thick one, and does not drag so much on the work.

DESCRIPTION FIG. 11905.

This machine is designed for grinding knives on which the bevel is desired to be perfectly flat. With a thin knife a disk wheel will give good results, but when the knife is thick, like a shear knife or a long paper-cutting knife, our experience and that of our customers is that a cylinder wheel should be used.

The column is large and stiff, and the bed will not spring when the machine is bolted to the floor.

The emery wheel is carried on the end of a steel spindle running in extra long bearings fully protected from dust, with provision made for taking up the end thrust. The spindle is mounted on a carriage which is fed to the work, either by hand or automatically. The automatic feed may be omitted if desired.

The water supply is so arranged that all water is distributed by the pump on the wheel directly in front of the knife. A water hood is arranged to cover the wheel, catching all waste water and spray and leading same back to the siphon tank. The table is so arranged that no water will remain upon it. The pump and connections may be coated if desired.

The table has both hand and power feed, with automatic reverse at each end of the stroke. The length of the travel may be regulated by adjustable dogs. The lever shown on the front of the machine enables the operator to instantly stop or start the movement of the table at any point in its travel without stopping the emery wheel. The platen is wide and travels on wide ways.

The bar on which the knife is clamped is strong and is so arranged that the wheel will grind toward the edge, or the bar may be reversed, and the knife ground toward the butt. Each end of the knife may be moved to or from the wheel by small hand screws. By this device the edge of the knife may be brought perfectly parallel to the guides on which the platen travels; after which the emery wheel is brought to the edge of the knife to the desired bevel, as the knife may be set at any angle with the wheel.

DIMENSIONS.

Size of base of column.....	39" x 40"
Height from floor to center of spindle.....	37 3/4"
Length of bearings.....	5" and 5 1/2"
Diameter of spindle in bearings.....	2 1/2" and 1 3/4"
Size of driving pulley.....	6 1/2" x 5 1/2"
Size of emery cylinder.....	14" x 5 1/2" x 12"

WEIGHTS.

26" machine complete, shipping weight, about.....	2,200 lbs.
30" machine complete, shipping weight, about.....	2,400 lbs.
36" machine complete, shipping weight, about.....	2,500 lbs.
42" machine complete, shipping weight, about.....	2,600 lbs.

COUNTERSHAFT.

The countershaft for this machine has tight and loose pulleys 9" x 4 1/4", driving pulley 18" x 8 1/2", drop of hangers 12", and should run about 300 revolutions per minute.

DESCRIPTION FIG. 11905.

STYLE A KNIFE GRINDER



FIG. 11908

Will grind either straight or concave bevel. Attachment for using water for style A, consisting of tank, pump and necessary fixtures can be supplied.

SIZES.

- To grind knives to 26", 400 lbs.
- To grind knives to 32", 450 lbs.
- To grind knives to 38", 500 lbs.
- To grind knives to 44", 525 lbs.
- To grind knives to 54", 550 lbs.

DESCRIPTION FIG. 11907.

A simple automatic bench knife grinder for small factories, will grind either straight or concave bevel. Tight and loose pulleys are 4" in diameter, 3" face, and should run 1,400 revolutions per minute. Emery wheel, 6" diameter, 3" face, 1" hole.

SIZES.

- To grind knives up to 26" long, 250 lbs.
- To grind knives up to 32" long, 275 lbs.
- To grind knives up to 38" long, 300 lbs.

STYLE E KNIFE GRINDER.



FIG. 11907.

KNIFE GRINDERS.

DESCRIPTION FIG. 11908.

The emery wheels supplied with machines are 12" in diameter, 4" face. They can be used up almost entirely.

The tight and loose pulleys are 8" in diameter, and should run 800 revolutions per minute.

We keep the following in stock with knife bars or holders suitable for ordinary knives, but will furnish machines with bars suitable for any knife, without extra charge. When ordering, please send description of knives to be ground.

STYLE C KNIFE GRINDER.



FIG. 11908.

SIZES.

To grind knives up to 54°	1,375 lbs.	To grind knives up to 84°	1,600 lbs.
To grind knives up to 60°	1,400 lbs.	To grind knives up to 90°	1,700 lbs.
To grind knives up to 66°	1,430 lbs.	To grind knives up to 96°	1,800 lbs.
To grind knives up to 72°	1,460 lbs.	To grind knives up to 108°	1,900 lbs.
To grind knives up to 76°	1,500 lbs.	To grind knives up to 120°	2,100 lbs.

Tank, pump and necessary fixtures for water, extra. Will grind either straight or concave level.

SAW GRINDERS.

NO. 1 AUTOMATIC SAW SHARPENER.



FIG. 11909.

NO. 2 AUTOMATIC SAW SHARPENING MACHINE.



FIG. 11910.

DESCRIPTION FIGS. 11909 AND 11910.

These machines are intended for sharpening blades for metal cold saws and are rapid in operation and therefore very desirable where speed is desired.

No. 1 machine will sharpen saw blades from 10" to 40" in diameter. It is fully automatic and will grind the saw blades at the rate of forty teeth per minute, and any pitch of tooth up to 13 1/4°.

No. 2 machine will sharpen saw blades 24" to 84" in diameter. This machine is fully automatic, and will handle very heavy saw blades at the rate of from fifteen to twenty-five teeth per minute. It will grind any pitch of tooth up to 2°.

SAW GRINDERS.

NO. 1 SAW SHARPENER.



FIG. 11911.

DESCRIPTION FIG. 11912.

This machine is designed for sharpening circular wood saws. It is built in two sizes, as follows:

No. 1 automatic, as shown, with three emery wheels, wrenches, table, etc. Shipping weight, 150 lbs.

This machine stands on a table which we supply, using same for a packing crate.

4" tight and loose pulleys should run 900 revolutions per minute.

Circular cross-cut saws can be sharpened on this machine, but not automatically.

No. 2 automatic, for saws 8" to 48" diameter, heavier than No. 1, with three emery wheels.

Shipping weight, 250 lbs.

Thirty days' trial to responsible parties.

6" pulleys should run 600 revolutions per minute.

Circular cross-cut saws can be sharpened on this machine, but not automatically.

DESCRIPTION FIG. 11911.

In designing our No. 1 saw sharpener our aim has been to produce a grinder which would do perfect work and which could be sold at a moderate price.

The saw is placed on a swinging bracket. This bracket is mounted on a turntable which may be revolved on its slide, bringing the swinging movement at any angle with the emery wheel.

The saw bracket is placed at an angle of 15° with the spindle of the wheel, giving the result of a cup or saucer shaped wheel with a disk wheel. The disk wheels are more easily replaced when worn out.

The saw is ground both on the face and top of the teeth, thus keeping the teeth of the same shape and size, regrinding the saw as it is sharpened. The teeth are accurately indexed by an index plate, insuring uniform spacing. Index plates for any number of teeth can be furnished.

The turntable, upon which the swinging bracket is mounted is graduated in degrees, allowing it to be set accurately to give the right shape of tooth and the right amount of rake or clearance.

A water tank with water guards and pump furnishes water which prevents drawing the temper in the teeth.

Saws from 10° to 20° may be ground.

Emery wheel 12" diameter.

Floor space 21" x 30"

Height, 4'.

Net weight, 350 lbs.

AUTOMATIC SAW SHARPENER FOR WOOD SAWS.



FIG. 11912.

SAW GRINDERS.

DESCRIPTION FIG. 11913.

This machine is simple in design and easily operated. After the teeth of a band saw have been put into good and uniform shape by the use of this machine but little attention is needed to maintain them in perfect shape and efficiency.

The sharpening is finished complete, and is better than can be done by hand. The pawl moves the saw at the rate of about thirty-five teeth to the minute. The emery wheel moves in and out of each tooth as it passes, grinding either front, throat or back, or all three, as may be deemed necessary.

Machine is made in two sizes, viz.:

- No. 5, for saws 2" to 5" wide.
- No. 6, for saws 2" to 8" wide.

IMPROVED BAND SAW SHARPENER.



FIG. 11913.

THE FAIRBANKS SAW SHARPENING MACHINE.



FIG. 11914.

DESCRIPTION FIG. 11914.

This machine is designed to sharpen saws with emery wheels instead of files, and if properly used saves a large amount of time, keeping the saws in perfect condition.

Set the machine on a smooth bench or table, in position as shown in cut, and belt to run grinder 1,800 revolutions per minute. Bolt bracket that carries swing arm firmly to the bench, put saw on mandrel, and by sliding the mandrel on swing arm, bring it in right position to give tooth the shape desired; grind to the depth desired and then hold the saw in that position and adjust the thumbscrew on back of swing arm so that it will stop in same place for every tooth.

If the saw is out of round, swing back so points of teeth will just touch the grinder and turn the saw around until it is jointed; grind the fronts of teeth all around to the depth to which it is adjusted and finish up backs. After once putting saw in shape, it is only necessary to grind the fronts of teeth, which will take about a minute.

For cutting-off saws proceed as before, only loosen thumbscrew in slotted circle and incline mandrel to get desired bevel of teeth, and fasten firmly in that position and grind every other tooth; then tilt the mandrel the other way and grind the rest.

For grinding shimmer heads, take saw mandrel out of socket in slide and put in mandrel to fit the head, then proceed as with saw. For matcher, bits, chisels, etc., use flat face wheel and tilting table adjusted to proper bevel, using care not to heat or blue the thin edge of such tools.

This machine was not designed for cleaning castings or rough work, but is finely made and has many accurate adjustments. For keeping shop tools in order it is invaluable.

CUTTER GRINDERS.

DESCRIPTION FIG. 11915.

This small machine has ample capacity for all the ordinary sizes and varieties of milling cutters, while its compactness and small cost render it practicable to have several distributed around the shop in the vicinity of each group of milling machines, where they will prove a valuable addition to the plant and soon pay for themselves in time saved.

The machine is well made throughout and will grind straight or spiral mills and shell reamers from 5" diameter and 4" face down to the smallest; side or face mills, bevel or angle cutters from 5" down; hand, machine, rose and taper reamers, as large as 1 1/2" diameter and 8" long; butt mills, either straight or taper; cutters for milling T slots and hollow mills, such as used on screw machines; saws, cutters, for gear teeth, drills, and all such tools as are generally ground by hand can also be handled. Both spindle and arbor are of steel, hardened and ground, the latter to 1" standard size. All adjusting screws and nuts are case hardened and fit wrench attached to the machine. The machine can be placed on the bench where most convenient and driven by straight or quarter-turned belt.

The spindle is provided with an eccentric adjustment for feeding the wheel against the work.

Equipment: 1 double-end wrench; 1 emery wheel; 1 plain countershaft.

SPECIFICATIONS.

	Bench.	Mounted.
Width of spindle belt.....	1"	1"
Tight and loose pulleys on countershaft.....	2" x 1 1/2"	3" x 1 1/2"
Speed of countershaft, revolutions per minute.....	650	650
Net weight, complete.....	65 lbs.	75 lbs.
Floor space required.....	20" x 10 1/2"	20" x 10 1/2"
Foreign shipment, tight boxed (size), cubic feet.....	1/2	1/2
Foreign shipment, tight boxed (weight).....	80	80

NO. 1 CUTTER GRINDER.



FIG. 11915.

CUTTER AND REAMER GRINDERS.

NO. 2 CUTTER GRINDER.

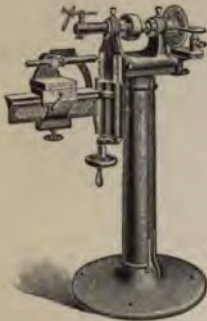


FIG. 11916.

DESCRIPTION FIG. 11916.

This is a simpler machine than the No. 3, but has a number of the features found in that machine. The spindle head and knee are identical with the No. 3. The knee is adjustable and is provided with a tool rest arm, which may be swung out of the way when not needed.

The front bearing is extended, forming an outboard support for the end of the spindle, thus preventing any vibration. The spindle is hollow, and is provided with a drift rod for removing the arbors. The rear end extends beyond the bearing and is arranged to carry emery wheels up to 8" diameter. A rest is also provided for grinding small tools.

The guide finger is fixed in a yoke, which clamps around the end of the front bearing, giving a wide range of adjustment and being quickly and easily set.

The index head can be set and bound at any angle vertically by graduated index and is horizontally adjustable in all directions on the top of the yoke and locked by cam binder. The same mechanism that binds the index head vertically binds the mandrel on which the cutter slides. The yoke holding the index head has a light movement on the knee and can be bound at any point.

For grinding straight mills, the cutters are slid on the mandrel, and for angle cutters, the index head is set at the proper angle and the yoke moved in and out on the knee; but the same operation may be done in different ways.

With this machine all sizes and shapes of cutters can be handled, from 1½" to 8½" diameter, and face mills up to 12" diameter. Centers for grinding taper reamers, etc., similar to that of the No. 3 are furnished extra. The top of the knee is shielded from emery by a steel plate.

Equipment: 2 wrenches (chained); 1 emery wheel; 1 arbor; 1 sleeve 1 plunger; 1 plain countershaft.

SPECIFICATIONS.

Width of spindle belt.....	1½"
Tight and loose pulleys on countershaft.....	4½" x 2"
Speed of countershaft, revolutions per minute.....	400
Floor space required.....	36" x 23"
Domestic shipment, crated, weight.....	375 lbs.
Foreign shipment, tight boxed, 30 cubic feet, weight.....	450 lbs.

DESCRIPTION FIG. 11917.

Our universal cutter and tool grinder is a simple, high-class machine perfectly adapted to its work. Every feature of the machine represents the evolution of years of experience and suggestion and is confidently presented to the judgment of mechanics.

The spindle is hardened and ground and supported out close to the wheel by an extended bearing and carefully protected from emery. The knee, and the yoke carried on the knee, both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head. Straight spiral mills are ground by mounting on a sleeve sliding on the mandrel, no accurate leveling up being required. Other mills are ground by the movement of the table.

A sleeve with stepped collars is provided to accommodate cutters of different size holes. Taper reamers, etc., are held on centers mounted in the index head. Taps and other tools can also be held in this way. Small taper shank butt mills are held by the taper shank in a No. 7 B. & S. taper socket and ground true under working conditions. Larger shank mills or cutters mounted on a No. 10 B. & S. taper shank arbor are held in the same manner in a larger socket and ground together in one gang without removal. Angle mills are held at the proper angle by a plug in the head. Large straddle mills and inserted tooth cutters are ground on the side face by laying flat on the table and centered on plug. The guide finger is split to spring over to the next tooth without running off the cutter and is held on the end of the spindle bearing, except in grinding small butt mills on which the finger is held on the attachment itself. Gear cutters and other formed cutters and tools are ground by the large thin wheel and rest at rear end of spindle.

A vise can be mounted on the table and surface grinding and grinding of snap gauges, etc., conveniently done. A hard-wood cupboard is provided inside the column to hold the attachments and protect them from injury.

Equipment: reamer centers; 1½" cutter arbor; 1½" adjustable collar; ¾" cutter sleeve with adjustable stepped collar; ½" adjustable arbor; ½" adjustable collar for arbor; face mill stud; cutter stud; socket; finger attachment; universal finger and holder; 3 arbors with 3 emery wheels; 1 large emery wheel; universal cutter head; 1 arbor socket; 1 table crank; 2 wrenches; plain countershaft.

GENERAL DIMENSIONS.

Floor space required.....	45" x 28"
Vertical adjustment of knee on column.....	6½"
Adjustment of sliding table in line with spindle.....	9½"
Dimensions of surfacing table.....	6" x 10"
Travel of surfacing table.....	9½"
Capacity of machine: cutters, 14" diameter by 6" face; surfaces.....	6" x 1½"
Diameter of emery wheel in rear.....	6"
Size of vise furnished (extra price).....	No. 2
Width of belt.....	1½"
Tight and loose pulley on countershaft.....	4½" x 2"
Speed of countershaft, revolutions per minute.....	400
Domestic shipment, crated, weight.....	435 lbs.
Foreign shipment, tight boxed, 33 cubic feet, weight.....	525 lbs.

NO. 3 UNIVERSAL CUTTER AND TOOL GRINDER.



FIG. 11917

CUTTER AND REAMER GRINDERS.

DESCRIPTION FIG. 11918.

We desire to call special attention to this simple machine for grinding milling cutters, taps, taper reamers, lathe tools, etc., etc. Cutters to 6" in diameter, both spiral and straight; reamers 14" and less in length can be ground in this machine. It is made from new and improved patterns. All slides are covered to protect them from dust and emery. The bearings are covered with dust caps and are adjustable for wear, and the ways are gibbed, so that the machine can always be kept in good working order. The swivel slide is graduated on one end and provided with a clamping device for securing it in any desired position. It is operated by a lever which can be removed instantly when desirable. The flat rest can be fastened in position or removed by simply tightening or loosening the clamping nut.

An attachment is furnished for grinding all kinds of end mills, bevel mills, side cutting mills, angular cutters, etc., and with a special attachment (which is extra) all kinds of involute gear cutters and small cutters of special form which require grinding on the face of the tooth. This attachment is graduated on its surface and is reamed for 3/4" arbor.

We furnish this machine with a double countershaft and special attachment for grinding circular work, at an extra price. This attachment will take an arbor 14" long between the centers, and will grind work 8" in length and 5" in diameter. This is a good deal more of a machine than the price would indicate. It is capable of a great variety of work.

GENERAL DIMENSIONS.

Tight and loose pulleys on countershaft 2" face, 4" diameter; loose pulley supplied with oil reservoir. Speed of countershaft, 500 revolutions per minute. Weight of machine and base, complete, 250 lbs. Boxed for foreign shipment, grinder, gross weight, 175 lbs., 6 cubic feet; base, gross weight, 195 lbs., 8 cubic feet.

CUTTER AND REAMER GRINDER, WITH SWINGING KNEE.



FIG. 11919.

DESCRIPTION FIG. 11919.

This grinder combines, for a little money, many of the advantages of the high-priced universal. It is mounted so it will swing at any horizontal angle to the spindle of the wheel, and present work at any angle to either wheel. This enables cup wheels to be used as easily as wheels of ordinary form, and is of great importance.

All slides are covered to protect them from dust and emery. The bearings are covered with dust caps and are adjustable for wear, and the ways are gibbed so the machine can always be kept in good working order. The table can be elevated or depressed, and it has many other points of excellence.

Weight of machine, complete, 300 lbs.

Boxed for foreign shipment, gross weight, 425 lbs.

Machine is furnished in two styles, viz.:

Style A. Grinder with base and countershaft.

Style B. Grinder with base, circular attachment, and double countershaft.

Extras can be supplied as follows:

Attachments for grinding form cutters, three indexes.

Extra indexes.

Attachment for internal grinding.

Attachment for grinding die chasers, including internal grinding attachment.

PLAIN CUTTER AND REAMER GRINDER.



FIG. 11918.

CUTTER AND REAMER GRINDERS.

UNIVERSAL CUTTER AND REAMER GRINDER.

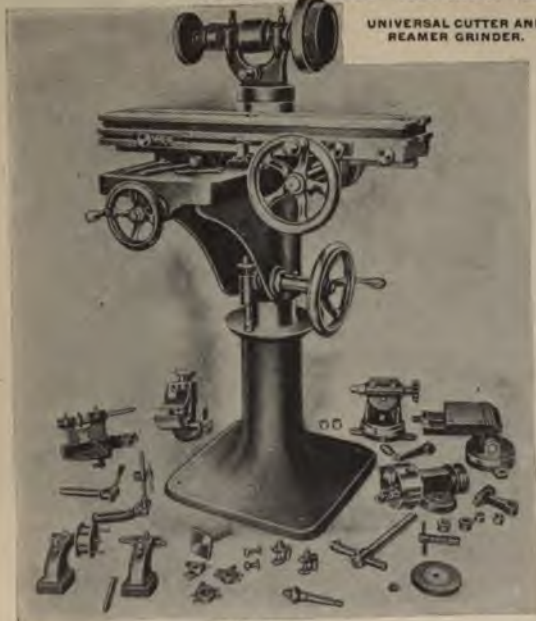


FIG. 11920.

Each machine is furnished with countershaft, cupboard and set of attachments as follows:

- No. 1. Swivel vise with handle.
- No. 2. Bevel and face mill holder.
- No. 3. Taper shank butt mill holder.
- No. 4. 4" chuck to be fastened to No. 2.
- No. 5. Internal grinding attachment.
- No. 6. Holder for gear cutters, etc.
- No. 7. Center heads with dogs and clamps.
- No. 8. Adjustable tooth rest holder and rest.
- No. 9. Tooth rest holder for spiral cutters.
- No. 10. Rest for hand work.
- No. 11. Cup wheel holder with wheel.
- No. 12. Right-hand wheel holder.
- No. 13. Left-hand wheel holder.
- No. 14. Three wrenches.

For specifications see following page.

DESCRIPTION FIGS. 11920 AND 11921.

This machine is designed to meet the demands of manufacturers who require, at a moderate cost, a medium size Universal grinder, accurately constructed and capable of doing a large variety of work economically. The machine is beyond the experimental stage and the high grade workmanship used throughout its entire construction is thoroughly inspected before the machines are delivered.

It is adapted for grinding to size, straight and taper arbors, cylindrical or conical work upon centers or in the chuck; for sizing internal work and for sharpening straight, taper or rose reamers; spur, bevel, spiral, form or end cutters; taps, countersinks, counterbores for grinding gauges, dies, keys, ends of rods and many other similar operations.

The spindle is carefully ground and all sliding surfaces and bearings are scraped to fit and well protected from dust. The cross-feed screw is graduated to thousandths of an inch, also the top swivel slide is graduated to $\frac{1}{8}$ "-1" and is provided with screw adjustment for aligning the centers. The circular standard allows the knee and slide to swing around the head at any convenient angle with the wheels. The wheels are held on taper centers and, when taken off and put back, will remain true.

CUPBOARD AND ATTACHMENTS.



FIG. 11921.

THE UNIVERSITY OF CHICAGO PRESS

CUTTER AND REAMER GRINDERS.

SPECIFICATIONS, FIGS. 11920 AND 11921.

Swing over table.....	67 $\frac{1}{2}$ "	Capacity of chuck.....	4"
Between centers.....	21"	Speed of main spindle, revolutions per minute.....	3,000
Traverse of carriage.....	19"	Speed of countershaft, revolutions per minute.....	600
Cross feed.....	6"	Diameter of circle required to revolve table around base.....	64"
Vertical feed.....	8"	Net weight of grinder complete.....	582 lbs.
Will grind cutters on centers, diameter.....	6 $\frac{1}{2}$ "	Gross weight, boxed for shipment.....	800 lbs.
Will grind cutters on holder, diameter.....	11"	Measurements of box.....	36" x 39" x 51"
Vise jaws open.....	21 $\frac{1}{2}$ "		
Height of vise jaws.....	11 $\frac{1}{4}$ "		

DESCRIPTION FIG. 11922.

This grinder was designed to meet the wants of a substantial machine that will grind accurately anything within its range without springing or twisting, and can be operated under all conditions. It will grind all cutters used in a machine shop, such as milling cutters, gear cutters, reamers, gauges, shafts, bushings, external and internal, and all similar tools. The wheel spindle head can be swiveled 180° and can be locked in any position. Ample provisions are made to compensate for wear on the spindle. The entire head is dustproof.

All bearings, slides and screws are covered dustproof.

The adjusting hand wheels are of large size and are graduated on the periphery reading to thousandths of an inch.

The table has a slow and fast movement in ratio of 1 to 3. It swivels on a central stud 270° and may be clamped in any position. It has graduated arc in front reading degrees and there is a scale imbedded in slide below table which reads to 3" taper per foot either way. One end of the table is formed to a worm which engages a worm, by means of which the table can be readily adjusted either way to the desired taper.

For all operations there is but one tooth rest used. It is universal in construction and has a micrometer adjustment for accurate setting in any position.

The machine is furnished with a 3" chuck; swivel vise opening 3" clamps straight and taper work; universal center and tail stock, raising blocks, internal grinding attachment, set of steel bushed emery wheels, drum and main counter-shaft.

UNIVERSAL CUTTER AND REAMER GRINDER.



FIG. 11922.

SPECIFICATIONS.

Tables move longitudinally.....	15"
Transverse movement.....	8"
Vertical movement.....	7 $\frac{1}{4}$ "
Swing between centers.....	9"
Swing between centers, with raising blocks.....	12"
Takes from centers.....	20"
Grinds face mills.....	16"
Grinds saws, in diameter.....	36"
Net weight.....	1,020 lbs.

CUTTER AND REAMER GRINDERS.

NO. 1 UNIVERSAL CUTTER, REAMER AND TOOL GRINDER.



FIG. 11923.

This machine is furnished in the following styles:

Style A. Plain grinder has the following equipment, which is sufficient to cover all the operations involved in grinding the cutting edges of milling cutters and reamers.

One universal head and tail stock, complete with centers.
 Tooth rest No. 3A and holder No. 3 for large cutters.
 Tooth rests Nos. 6, 7 and 8 and holder No. 4 for small cutters and counterbores.
 Tooth guide and holder No. 2 for spiral cutters.
 Tooth rest holder No. 1 for reamers.
 Centering gauge for setting height of tooth guide.
 Two long screws and one nut for holding cutters on universal head spindle.
 One $\frac{3}{4}$ " x 1" bushing for cutters.

Hand rest.
 One wrench.
 Emery wheel, shape 1.
 Emery wheel, shape 2.
 Weight, net, 500 lbs.
 Shipping weight, domestic, 700 lbs.
 Shipping weight, export, 750 lbs.
 Size case, export, 51" x 42" x 26".
 Contents case, export, 32 cubic feet.

Extra attachments for Style A machine are as follows:

For cylindrical grinding, the following additional parts are furnished:

Drum with secondary countershaft complete.
 Pulley and collar on cutterhead spindle.
 Disk or saw-grinding chuck, fitted to universal head spindle.
 3" universal chuck fitted.

One set of fifteen dogs, from $\frac{1}{4}$ " to $1\frac{1}{4}$ " with wrench and tray for same.
 Emery wheel, shape 3.
 Emery wheel, shape 5.

For surface grinding, the following additional parts are furnished:

Swivel vice, with angle and two clamping bolts
 Emery wheel, shape 4.

For gear-cutter grinding, gear-cutter attachment, two bushings, emery wheel, shape 3.

For grinding the face of teeth in taps, hobs and formed cutters, etc.:

One pair drop centers, complete with hardened and ground centers. One tooth rest, No. 5. Two bolts.

For internal grinding:

Internal grinding attachment.
 Pulley, belt.
 Emery wheels, shape 6.

This attachment can be used only when the circular grinding outfit is furnished.

Style B. Universal cutter and tool grinder, complete with all attachments, as shown in illustration:

Net weight, 645 lbs.
 Shipping weight, domestic, 900 lbs.
 Shipping weight, export, 950 lbs.

Dimensions of box, export, 52" x 43" x 26".
 Contents of box, export, 32 cubic feet.

Extra special attachment for sharpening large face mills. This attachment consists of the following parts:

One swiveling head, with No. 12 B. & S. taper hole in spindle and base.
 One collet No. 12 to No. 11.
 One collet No. 12 to No. 10.

One collet No. 12 to No. 9.
 One emery wheel (double T-shaped section).
 One extension for emery wheel spindle.
 One tooth rest and holder.

DESCRIPTION FIG. 11923.

This machine has a horizontal range of 12" at right angles with the knee, a transverse movement to and from column of $6\frac{1}{2}$ ", a vertical movement of $3\frac{1}{4}$ ", and is designed to grind with accuracy and dispatch work of the following kinds and sizes:

Work 16" long held between centers when the diameter of rotation is not more than 8". These dimensions are given as the limit for irregular pieces, and not for heavy, solid cylinders.

Slitting saws for cold sawing up to 24" in diameter can be sharpened. Reamers and shell counterbores of large or small sizes.

Gear cutters and formed cutters of every description.

Flat surfaces, such as shear blades, dies and gauges.

Hardened bushings, and other pieces to be ground internally.

Conical surfaces, such as taper bearings and mandrels, and small cylindrical machine parts which are to be finished with extreme accuracy.

We can supply an attachment that will take face and straddle mills 12" in diameter and end mills with shanks up to and including No. 12 R. & S. taper.

The foregoing list does not give the limit of the capacity of the machine, but rather indicates in a general way what is possible in its use.

SUMMARY OF DIMENSIONS.

Length of table.....	25"
Horizontal range.....	12"
Transverse movement.....	6 $\frac{1}{2}$ "
Vertical movement.....	3 $\frac{1}{4}$ "
Centers take in length.....	16"
Will grind (using special attachment) face mills.....	12" diameter
Will grind cutters between centers.....	8" diameter
Will grind saws.....	24" diameter

MAY 1900
MAY 1900
MAY 1900
MAY 1900
MAY 1900

CUTTER AND REAMER GRINDERS.

NO. 2 UNIVERSAL CUTTER, REAMER AND TOOL GRINDER.
MOTOR-DRIVEN.



FIG. 11924.

DESCRIPTION FIG. 11924.

This machine is regularly furnished with countershaft for belt drive, but can be supplied with motor drive, as shown, if so desired.

The following parts comprise the equipment of the complete machine:

Single-speed countershaft with tight and loose pulleys.

Universal swivel head and tail stock. This has a No. 12 B. & S. taper hole for holding face mills and end mills on their own shanks for grinding. It is fitted with four collets, as follows:

1 collet, No. 12 taper outside, No. 11 taper inside

1 collet, No. 12 taper outside, No. 10 taper inside.

1 collet, No. 12 taper outside, No. 9 taper inside.

1 collet, No. 12 taper outside, No. 7 taper inside.

Two extensions for emery wheel spindle, for surface grinding, some classes of internal grinding and for sharpening side teeth on large side mills.

Emery wheels, all steel bushed to fit spindle $\frac{3}{4}$ " diameter within .001", as follows:

No. 9, 1" diameter, $\frac{1}{4}$ " face (with internal grinding attachment).

No. 10, 4" diameter, $\frac{1}{4}$ " face.

No. 11, 6" diameter, $\frac{1}{2}$ " face (with surface grinding attachment).

No. 12, 10" diameter, $\frac{1}{2}$ " face (with cylindrical grinding attachment).

No. 13, cup wheel, 4" diameter, $1\frac{1}{2}$ " face.

No. 14, cup wheel, 6" diameter, 2" face

No. 15, T-shaped wheel, 4" diameter, $1\frac{1}{2}$ " face.

No. 16, disc-shaped wheel, 6" diameter.

Raising block for swivel head, when sharpening large face mills.

Centering gauge for setting height of tooth rest.

Complete set of wrenches.

Internal grinding attachment. Complete with pulley, belt, and one emery wheel shape No. 9, specified above.

Cylindrical grinding attachment. Consists of variable speed (six-speed) drum countershaft; center rest to take work $2\frac{3}{4}$ " diameter; 6" universal chuck; saw grinding chuck; grooved pulley for universal swivel head spindle; one set of twenty-nine dogs, from $\frac{1}{4}$ " to 4"; sizes, $\frac{1}{4}$ " to 1", advancing by sixteenths; from $1\frac{1}{8}$ " to 2", advancing by eighths; from $2\frac{1}{4}$ " to 4", advancing by fourths.

Emery wheel, No. 12, specified above.

Surface grinding attachment. Consists of universal swivel vise; two clamping bolts; one emery wheel, No. 11, specified above.

Gear cutter grinding attachment. Complete with two bushings.

For the accommodation of those whose immediate needs do not call for a complete machine, the several outfits mentioned above under the different attachment headings, can be omitted and credit will be given. However, the internal grinding outfit cannot be used unless the machine is arranged for cylindrical grinding.

Description continues

CUTTER AND REAMER GRINDERS.

DESCRIPTION FIG. 11924.—Continued.

THE ELECTRICALLY-DRIVEN GRINDER.

When the grinder is arranged for direct-connected motor driving, as illustrated, the countershafts are omitted, and motors of the following specifications are substituted:

For the main drive—one 1½ horse-power motor, fully enclosed, with dustproof casing and with dustproof bearings. This is a constant-speed motor, and the speed should not be over 1,200 revolutions per minute.

One starting box for above motor.

Any motor answering the above general specifications will do.

For revolving work—one ¾ horse-power enclosed motor with starter. (This is a special motor and must be furnished with the grinder.)

SPECIFICATIONS.

Centers—Swing 12" diameter; take 36" in length.

Automatic Feed.—24'; eight changes of feed for each spindle speed, ranging from 8½" to 65½" per minute.

Swivel Head.—Has No. 12 B. & S. taper hole for holding cutters on their own shanks for grinding. Will take face and side milling cutters up to 24" diameter, 3" face, grinding three sides of blades without re-chucking.

Spindle.—Tool steel; runs in phosphor bronze boxes adjustable for wear.

Spindle Speeds.—Four in number: 1,800, 2,300, 3,100 and 4,300 revolutions per minute.

Table.—46" long. Has a ½" T slot, and swivels about a fixed center; has graduated arc reading in degrees, and scale at end reading up to 3" taper per foot. It can be lowered 12" below center of emery wheel spindle.

Surface Grinding.—It will take work 7" x 24" on table.

Swivel Vise.—Has jaws 4" wide; 1½" deep; opening, 3½".

Internal Grinding Attachment.—Will finish holes ¾" diameter and larger by 4" deep. It has four speeds, from 7,900 revolutions per minute to 19,000 revolutions per minute.

Internal grinding can also be done by extension on main spindle. It will grind holes 1½" diameter and larger by 5" deep.

Net weight of complete machine with countershafts about 2,235 lbs.

Net weight of complete machine with motors about 2,560 lbs.

14" CUTTER AND REAMER GRINDER.



FIG. 11925.

DESCRIPTION FIG. 11925.

This machine is distinctively a cutter grinder and was designed to fill the want for a machine to sharpen milling cutters of all kinds and shapes without special fixtures or special shapes emery wheels, being heavy enough to eliminate all vibration and still be easily operated.

The main frame carrying the spindle is provided with two columns for the work carriages.

The left-hand side is used for grinding cutters on their periphery, those with holes by sliding on a bar before the wheel, and those on shanks being held on centers and fed with the table. The table which has a long bearing on the saddle has a longitudinal feed of 20", cross adjustment of 7", and a vertical adjustment of 6". The table can be used at different angles with the spindle in horizontal plane by swiveling the knee around the column.

The centers which are provided with a graduated swivel base, can be used in any position along the table. The bars, on which cutters without shanks are ground, are inserted in the head stock, the tail stock being removed.

The right-hand side is used for grinding end, side and angle cutters.

The sliding head, which can be swiveled in a vertical plane and adjusted for different angles of clearance, is set on compound saddles giving adjustment of 9" in line with the motion of the head, and 6" at right angles. It has a vertical adjustment of 10" and the knee can be swiveled on its supporting column.

Both sides are provided with scales of settings for the clearance angles, and stops for setting the fingers.

The spindle runs in self-centering bronze boxes.

SPECIFICATIONS.

Centers swing..... 14"
Maximum length that can be ground between centers..... 14"
Longitudinal feed of left-hand table..... 20"
Cross feed of left-hand table..... 7"
Vertical adjustment of left-hand table..... 6"
Vertical adjustment of right-hand sliding head..... 10"

Horizontal adjustment of cross slide on right-hand knee..... 8"
Longitudinal feed of top cross slide right-hand knee..... 5"
Cutter head slides on bar..... 2"
Weight, net..... 1,370 lbs.
Weight, boxed..... 1,700 lbs.
Contents, in cubic feet..... 96

CUTTER AND REAMER GRINDERS.

DESCRIPTION FIG. 11926.

These machines are well made and of best material. They are especially adapted for tool work, and are provided with attachments easily adjusted for the various operations of grinding milling cutters, reamers, counterbores, taps, end mills, holes, arbors, etc., and for surface grinding.

The sliding work tables can be made to traverse, as shown in the cut, when grinding holes, arbors, etc., or they can be swiveled around on the column to traverse at right angles to the wheel spindle for surface grinding; they can also be traversed at any angle between these two positions.

The circular top of the column is graduated. The cross slide is moved by means of the small hand wheel shown at the center in front.

With the No. 1 machine the following regular attachments are included: Five-speed countershaft, four-speed drum countershaft, chuck and spindle, internal grinding attachment for holes $\frac{3}{8}$ " diameter and upward, universal vise, combination attachment.

In addition to the above the following special attachments can be furnished at extra cost: Automatic table feed, face chuck and spindle, and internal grinding attachment for holes $\frac{3}{4}$ " diameter and upward.

With the No. 2 machine the following regular attachments are included: Automatic feed, four-speed countershaft, four-speed drum countershaft, chuck and spindle, internal grinding attachment for holes $\frac{3}{4}$ " diameter and upward, universal vise, combination attachment.

In addition to the above the following special attachments can be furnished at extra cost: Automatic cross feed, face chuck and spindle, and internal grinding attachments for holes 1" diameter and upward.

Both the No. 1 and No. 2 machines are arranged for automatic table traverse and can later be provided with same should it not be required at the time of ordering the machine.

An assortment of wheels, together with collets on which to mount them, is furnished with each machine.

Allowance will be made for any attachments not desired. They are interchangeable and can be added at any time.

UNIVERSAL CUTTER, TOOL AND REAMER GRINDER.

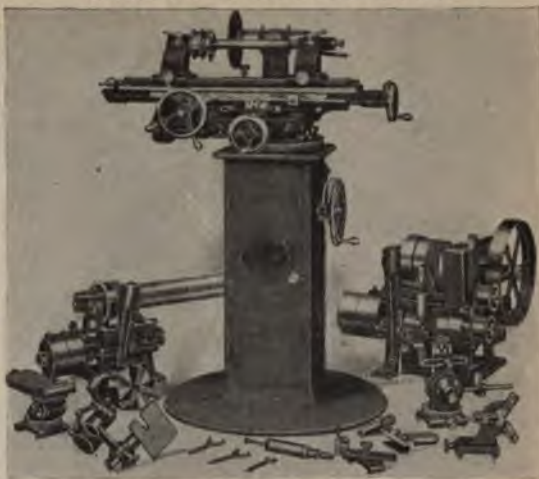


FIG. 11926.

SPECIFICATIONS.

	No. 1.	No. 2.
Swing over carriage.....	8" and 10"	10" and 12"
Between centers.....	16"	36"
Sliding movement of carriage.....	12"	24"
Cross-feed movement.....	6"	9"
Total cross-feed range.....	11"	9"
Vertical feed.....	6"	7 $\frac{1}{4}$ "
Grinds face cutters and similar tools.....	12" diameter x 3" wide	14" diameter x 3" wide
Number of emery wheels accompanying the machine.....	28	28
Number of interchangeable collets accompanying the machine.....	12	12
Floor space.....	36" square	
Shipping weight, with counter, about.....	1,500 lbs.	

UNIVERSAL GRINDERS.

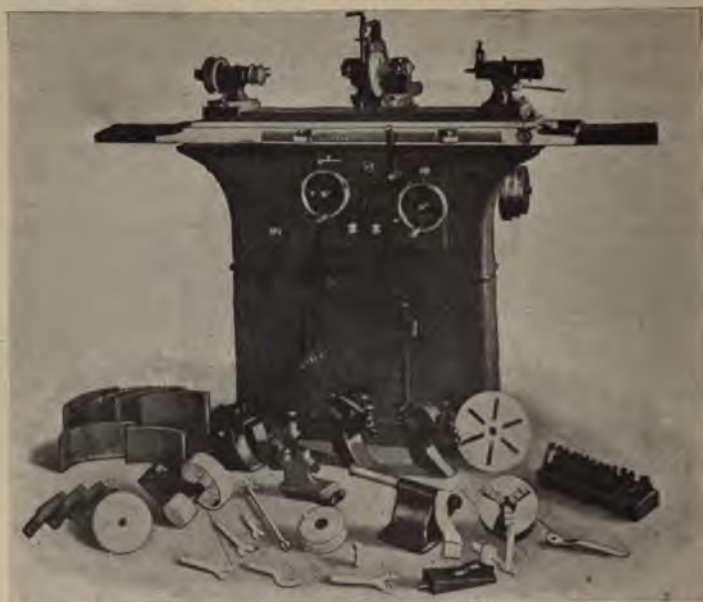


FIG. 11927.

DESCRIPTION FIG. 11927.

These universal grinders are very heavy and rigid with ample metal for preventing the ways from springing out of line. Wheel spindle is of tool steel, hardened, ground and lapped and runs in phosphor bronze boxes with means for taking up the wear. Table travels automatically and is governed by reversing dogs which are arranged so that the table can be run past the reversing point without changing the adjustment of the dogs.

The swivel table turns on a hardened central stud, can be clamped at both ends and can be set at an angle to the table ways for taper grinding. Adjustment is made by a screw at the right-hand end of the table.

Automatic cross feed gives a range of feed from one-eighth of a thousand to two thousandths of an inch to each reversal of the table and is so arranged that the feed of the wheel is stopped when the work is to size. A very simple attachment is provided for fine hand feeds.

Reversing mechanism, contained complete in a bracket screwed to the side of the machine, can be removed for cleaning or repairs by loosening four screws.

Head stock swivels and has graduated base. The spindle is hardened, ground and lapped and runs in phosphor bronze bearings provided with means for taking up the wear. The front end is threaded and has a standard taper hole. When grinding on dead centers, spindle is held stationary.

Head and foot stock are gibbed to the sides of the swivel table which permits of very large wearing surfaces and prevents them from getting out of line. When loosened for relocating, there is no wear either on the head and foot stock or on the swivel table.

The wheel stand, controlled by hand wheel at the front of machine, is full universal and its base is graduated to read to degrees. Platen which holds the wheel stand can be turned in reverse position for holding internal grinding fixture and counter bracket.

Universal back rests of new design for supporting long, slender work, provided with means for very fine adjustment. Diamond tool holder on foot stock permits of the wheel being trued without removing work. All wearing surfaces are protected from dirt.

Abundant supply of water from submerged pump in tank belted to side of machine. Price includes: internal grinding fixture, $4\frac{1}{2}$ " three-jawed chuck, face plate, face chuck, plain back rest, two universal back rests, set of dogs, center rest, one emery wheel for No. 1, two emery wheels for No. 2 machine, water guards, wrenches, overhead works complete, two dead center pulleys.

NO. 1.

Swings 9" in diameter and takes 26" in length. Swivel table scale graduated to read to $3\frac{1}{2}$ " either side of center line and $1\frac{1}{2}$ " taper per foot. Will take emery wheels up to 9" diameter, $\frac{5}{8}$ " face. Weight of machine complete about 2,400 lbs. Floor space, 36" x 94". Countershaft driving pulley, 10" diameter, $3\frac{1}{4}$ " face. Speed, 290 revolutions per minute.

SPECIFICATIONS.

NO. 2.

Swings 15" in diameter and takes 52" in length. Swivel table scale graduated to read to 5" either side of center line and 2" taper per foot. Will take emery wheels up to 15" diameter and 1" face. Weight of machine about 4,250 lbs. Floor space, 50" x 124". Countershaft driving pulleys, 12" diameter, 4" face. Speed of countershaft, 315 revolutions per minute.

PLAIN GRINDERS.



FIG. 11928.

DESCRIPTION FIG. 11928.

Atlas plain grinders are very heavy and rigid with ample metal for preventing the ways from springing out of line. Wheel spindle is of tool steel, hardened, ground and lapped, and runs in phosphor bronze boxes provided with means for taking up the wear.

Table travels automatically and is governed by reversing dogs which are arranged so that the table can be run past the reversing point without changing the adjustment of the dogs.

The swivel table turns on a hardened central stud, can be clamped at both ends and can be set at an angle to the table ways for taper grinding. Adjustment is made by a screw at the right-hand end of the table.

Automatic cross feed gives a range of feed from one-eighth of a thousand to two thousandths of an inch to each reversal of the table and is so arranged that the feed of the wheel is stopped when the work is to size. A very simple attachment is provided for fine hand feeds.

Reversing mechanism, contained complete in a bracket screwed to the side of the machine, can be removed for cleaning or repairs by loosening four screws.

Head and foot stock are solidly clamped to the face of the swivel table. They are not of the objectionable overhanging type, but the supporting body is directly under the work, preventing any vibration.

The center grinder is of new design and permits of the centers being ground to the exact angle without disturbing the adjustment of the swivel table if set to grind tapers.

Follow rest is held in an overhanging arm and can be turned out of the way when not in use.

Diamond tool holder on the foot stock permits of the wheel being trued without removing work. All wearing surfaces are protected from dirt and water. Ample water supply for the work from a submerged pump in a tank bolted to the side of the machine.

Universal back rests of new design for supporting long, slender work, provided with means for very fine adjustment. Countershaft with tight and loose pulleys, clutch for stopping work without stopping wheel.

Price includes: plain back rest, four universal back rests, set of dogs, center grinding attachment, one emery wheel, set of wrenches and overhead works complete.

NO. 11.

Will grind work to 5" diameter either straight or taper to 1 1/4" per foot and 31" in length.
Will take emery wheels up to 13" diameter, 3/4" face.
Floor space, 44" x 110". Weight, about 2,650 lbs.
Countershaft driving pulleys, 10" diameter, 3" face. Speed of countershaft, 295 to 325 revolutions per minute.

Will grind
foot or
Will do
Floor
Com
su

NO. 12.

or, either straight or taper to 2" per
and 1" face.
" face. Speed of
in.

PLAIN GRINDERS.

10" X 72" MACHINE—OVERHEAD DRIVE.



FIG. 11929.

DESCRIPTION FIG. 11929.

This machine is made in four lengths, viz.: 10" x 50", 10" x 72", 10" x 96", and 10" x 120".

SPECIFICATIONS 10" X 50" MACHINE.

Grinding Wheels.—Two wheels are furnished with this machine. One 18" diameter 2" face, and one 18" diameter 2" face, both for grinding soft and tool steel. If wheels for cast iron, hardened steel, or bronze are required, they can be supplied if ordered.

Size of Work.—This machine is made to swing 10" diameter in order to receive work having projections, and the occasional large, short piece; but principally to give room for suitable steady rests to support work from 1/2" to 4" diameter, up to 50" long, for which this machine is best suited.

Steady Rests.—Four universal steady rests are furnished with this machine, supplied with one set of work shoes for one diameter of work. Other sizes can be made from the blue print also furnished with the machine. These shoes are designed with a view to quick change from one size work to another, as well as convenient adjustment and rigid support for long, medium, and small work.

Taper Work.—Provision is made for grinding tapers up to 2" per foot.

Center Grinder.—A center grinding attachment is furnished with this machine, arranged to grind the center points perfectly round, true, and 60° angle. If a different angle of center is required, a special attachment can be made at extra cost.

Overhead Works.—An improved overhead works is furnished with this machine. The shafts are made of best material and ground on centers. They have large self-oiling bearings.

Weight of Machine.—With overhead works is about 5,800 lbs.

SPECIFICATIONS 10" X 72".

This machine and its furnishings are the same as the 10" x 50", except the following:

Length of Work.—It grinds work up to 72" long.

Steady Rests.—Six universal steady rests are furnished.

Taper Work.—Provision is made for grinding tapers up to 1 1/2" per foot.

Weight of Machine.—With overhead works is about 6,800 lbs.

Longer Work.—A machine like above to take in work 81" long we make to order.

SPECIFICATIONS 10" X 96".

This machine and its furnishings are the same as the 10" x 50" except the following:

Length of Work.—It grinds work up to 96" long, and is best suited for work from 1/2" to 3" full length, or 1/2" to 4", 72" long; although 4" diameter 96" long can be ground.

Steady Rests.—Eight universal steady rests are furnished.

Weight of Machine.—With overhead works is about 8,000 lbs.

It has no provision for grinding tapers, but has adjustment for producing straight work.

SPECIFICATIONS 10" X 120".

This machine and its furnishings are the same as the 10" x 50" except the following:

Length of Work.—It grinds work up to 120" long.

Size of Work.—From 1/2" to 3" diameter when 120" long, or 1/2" to 4" diameter when 72" long, is the work this machine is best suited for. It is designed to grind such work as lead screw blanks and lead rods, countershafts, etc.

It has no provision for grinding tapers, but has adjustment for producing straight work.

Steady Rests.—Ten universal steady rests are furnished with this machine.

Weight.—With overhead works is about 9,700 lbs.

PLAIN GRINDERS.

14" AND 18" PLAIN GRINDERS.



FIG. 11930.

DESCRIPTION FIG. 11930.

SPECIFICATIONS.—14" X 72" MACHINE.

Grinding Wheels.—Two wheels 20" diameter 2" face will be furnished; one suitable for grinding unhardened steel, and one for cast iron and hardened steel. Other wheels can be furnished to order. We can also arrange this machine for wheel 3" or 4" face for extra rapid grinding of special work.

Taper Work.—Provision is made for grinding tapers up to 2" per foot.

Size of Work.—This machine is made to swing 14" diameter in order to receive work having projections, and the occasional large, short piece; but principally to give room for suitable steady rests to support work from 1" to 6" diameter, up to 72" long, for which this machine is best suited.

Steady Rests.—Five universal steady rests are furnished, supplied with plain pieces of hard wood for work shoes, which can be used for many sizes of work. Special shoes for each size of work are best, and can be made from blue prints, which will be sent when requested, if size of work is stated.

Center Grinder.—A center grinding attachment is furnished, arranged to grind the center points round, true, and to 60° angle. If any other angle of center is required, a special pointing attachment can be made at extra cost.

Overhead Works.—An improved overhead works is furnished with this machine. The shafts are made of best material and ground on centers. They have large self-oiling bearings.

Weight of Machine.—With overhead works is about 10,000 lbs.

This 14" machine is designed to grind medium work heavier than can be handled by the 10" machine, and to take heavier cuts.

SPECIFICATIONS.—18" X 96" MACHINE.

Grinding Wheels.—Two wheels 24" diameter 2" face will be furnished, one suitable to grind unhardened steel, and one to grind cast iron and hardened steel. Other wheels can be furnished to order. We can also arrange this machine for wheel with 4" face for extra rapid grinding of special work.

Size of Work.—This machine is made to swing 18" diameter in order to receive work having projections, and short work up to 18" diameter; but principally to give room for steady rests to support work from 1" to 8" diameter, up to 96" long, for which the machine is best suited. Work as small as 3/4" diameter, however, can be ground.

Steady Rests.—Six universal steady rests are furnished, fitted with plain pieces of hard wood for work shoes, which can be used for many sizes of work. Special shoes for each size of work are best and can be made from blue prints which will be sent when requested, if size of work is stated.

Taper Work.—Provision is made for grinding tapers up to 2" per foot.

Center Pointer.—A center pointing attachment is furnished, arranged to grind the center points round, true, and to 60° angle. If any other angle of center is required, a special pointing attachment can be supplied, at extra cost.

Overhead Works.—An improved overhead works is furnished with this machine. The shafts are made of best material and ground on centers. They have large self-oiling bearings.

Weight of Machine.—With overhead

This 18" machine is designed for

the 14" x 72". It is "a good all round" machine.

PLAIN GRINDERS.

18" X 168" PLAIN GRINDER.



FIG. 11931.

DESCRIPTION FIG. 11931.

This machine is built in three lengths, viz.: to take 120", 144", or 168" between centers.

SPECIFICATIONS 18" X 120" MACHINE.

Grinding Wheels.—24" diameter, 2" or 4" face. Two wheels 24" diameter 2" face will be furnished, one for soft steel and small diameter of work, and one for hard steel and large diameters of work. If wheels for cast iron, hardened steel or bronze are wanted, we can supply them. We are prepared to furnish this machine with wheel 4" face for extra rapid cuts on special work, in which case one wheel only is furnished with the machine. Other wheels can be supplied to order.

Size of Work.—As these machines are designed for heavy work only, they are best suited for work from 4" to 18" diameter, although work as small as $\frac{3}{4}$ " may be ground. Work weighing 7,000 lbs. may be ground upon the centers with safety. A piece of steel 18" diameter, about 9' long weighs 7,000 lbs. A piece of steel 14' long, 14" diameter, weighs about 7,000 lbs. This machine grinds work 120" long.

Steady Rests.—Seven universal and plain steady rests are furnished with this machine. We can also furnish to order, special steady rests and heavy bearings for grinding work upon its journals.

Taper Work.—Provision is made for grinding tapers up to $1\frac{1}{2}$ " per foot.

Center Grinder.—A center grinding attachment is furnished, arranged to grind the center points to 60°. If different angle of centers is required a special attachment can be made at extra cost.

Overhead Works.—An improved overhead works is furnished with this machine. The shafts are made of best material and ground on centers. They have large self-oiling bearings.

Weight of Machine.—With overhead works about 18,000 lbs.

SPECIFICATIONS 18" X 144".

This machine with its furnishings is the same as the 18" x 120" except the following:

Size of Work.—This machine grinds work 144" long and up to 7,000 lbs. weight.

Steady Rests.—Eight universal and plain steady rests are furnished.

Taper Work.—Provision is made for grinding tapers up to $1\frac{1}{4}$ " per foot.

Weight of Machine.—With overhead works about 20,000 lbs.

SPECIFICATIONS 18" X 168".

This machine with its furnishings is the same as the 18" x 120" except the following:

Size of Work.—This machine grinds work 168" long and up to 7,000 lbs. weight. A piece 18" diameter 9' long weighs 7,000 lbs. A piece 14" diameter and 14' long weighs 7,000 lbs.

Steady Rests.—Ten universal and plain steady rests are furnished.

Taper Work.—Provision is made for grinding tapers up to $1\frac{1}{4}$ " per foot.

Weight of Machine.—With overhead works about 22,000 lbs.

PLAIN GRINDERS.

18" AND 30" X 96" GAP MACHINE FOR LOCOMOTIVE WORK.



FIG. 11932.

DESCRIPTION FIG. 11932.

Grinding Wheels, 24" x 4" and 24" x 1".—Two wheels 24" diameter, one with 4" face, offset, for grinding close to piston head, and one with 1" face for grinding crank pins, are furnished with this machine. It has no provision for grinding tapers, but has adjustment for producing straight work.

Size of Work.—This machine is made to swing 18" diameter in order to give room for suitable steady rests for supporting work from 1" to 8" diameter, this being the size of work for which the machine is best suited. A gap to swing 30" diameter is provided to receive piston heads and slide valve yokes.

Steady Rests.—Three universal steady rests are furnished, supplied with wood shoes suitable for grinding piston rods and valve stems. Special steady rests, extra heavy, for grinding truck and car axles can be supplied for this when ordered.

Center Grinder.—A center grinding attachment is furnished, arranged to grind the center points, round, true, and to 60° angle. If any other angle of center is required, special pointing attachment will be supplied, at extra cost.

Overhead Works.—An improved overhead works is furnished with this machine. The shafts are made of best material and ground on centers. They have large self-oiling bearings.

Weight of Machine.—With overhead works about 13,000 lbs.

This machine is special for grinding locomotive piston rods with heads in place, viz.: for repairing the rods after service without turning in the lathe. It is used also to grind new rods, direct from the roughing lathe cut, grinding off about $\frac{1}{2}$ " from the diameter in about 15 to 20 minutes.

Valve stems, crank pins, and axles are also ground in this machine.

The gap may be placed to order at any point along the table and may be of any width up to 24". In case the machine is required to grind "extension rods" the gap should be at the center of the table. If not otherwise ordered it will be placed, as in the cut, for ordinary rods. The gap swings 30".

This machine is well made and adapted to very heavy service.

18" PLAIN GRINDER, MOTOR-DRIVEN. REAR VIEW.



FIG. 11933.

SURFACE GRINDERS.

**SMALL SURFACE GRINDING MACHINE.
WITH PLAIN TABLE.**

DESCRIPTION FIG. 11934.



FIG. 11934.

This machine is useful for finishing a large variety of flat work, such as blanking, piercing and stamp dies, punches and similar work. It is arranged for two emery wheels; on one end a 12" x 2" wheel may be used for rough grinding, and the other end is fitted with removable taper shank arbor, which takes a 10" x 1" wheel for surface grinding. This allows quick changing of wheels and insures their running true.

One extra arbor is furnished with this machine. It takes a 10" x 1" wheel. The spindle is of steel, turned and ground, is straight and of one diameter in both bearings. It has spiral oil grooves in bearings. The bearings are cast iron, adjustable to wear, and can be replaced by new ones when necessary. Bronze boxes are furnished at a slight additional cost. The knee and table are counterbalanced by a weight within the column, making it very easy of adjustment. The table has a hinge on one end and an adjusting screw on the opposite end.

This arrangement allows a close adjustment to be made through 1". The bracket has a vertical adjustment of 10", allowing the table to be raised within 2 1/2" from center of spindle.

A patent countershaft is made for use with this machine. It should run about 575 revolutions per minute.

A water attachment is also made for use with this machine.

SPECIFICATIONS.

Height from floor to center of spindle.....	30 1/2"
Length of spindle over all.....	21"
Distance between wheels.....	16 1/2"
Length of bearings.....	front, 5 1/2"; rear, 6 1/2"
Diameter of spindle between flanges at back end.....	1"
Diameter of spindle between flanges on taper arbor.....	5/8"
Size of pulley on spindle.....	3 1/2" x 2 3/4"
Diameter of spindle in bearings.....	1 1/2"
Size of table.....	18" x 10"
Size of base.....	10" x 21"

WEIGHTS.

Machine and countershaft.....	500 lbs.
Machine only.....	430 lbs.
Countershaft only.....	70 lbs.

DESCRIPTION FIGS. 11935 AND 11936.

NO. A1-2.

Working table has a surface of 4" x 6"
Work up to 3" thick may be surfaced.

NO. A1-2 SURFACER.



FIG. 11935.

NO. B.

The working surface is 12" x 12".
A large variety of work may be performed.

SPECIFICATIONS.

	No. A1-2	No. B
Floor space.....	16" x 20"	20" x 24"
Height to center of spindle.....	37"	30"
Length of spindle.....	20 1/2"	32"
Length of bearings.....	3"	4 1/2"
Diameter of spindle in bearings.....	1 1/4"	1 3/4"
Diameter of spindle between flanges.....	1"	1"
Size of emery wheels.....	10" x 1"	14" x 2"
Distance between wheels.....	14"	21"
Size of pulley on spindle.....	4 1/2" x 3"	4 1/2" x 3"
Size of countershaft pulley.....	18" x 3"	12" x 3"
Tight and loose pulleys.....	4 1/2" x 4"	6" x 4"
Speed of counter per minute, revolutions.....	475	500
Speed of emery wheel, revolutions per minute.....	1,900	1,350
Weight of machine with wheels.....	255 lbs.	720 lbs.
Weight of counter.....	70 lbs.	80 lbs.

NO. B SURFACER.



FIG. 11936.

THE PATENT MACHINERY COMPANY

SURFACE GRINDERS.

DESCRIPTION FIG. 11937.

The surfacing tables are 20" x 8", and by the use of vertical screw with the hand wheel they are quickly adjusted as the wheel wears down.

Floor space.....	22" x 24"
Height to center of spindle.....	36"
Length of spindle.....	34"
Length of bearings.....	5"
Diameter of spindle in bearings.....	1 1/2"
Size of emery wheels.....	16" x 2"
Size of spindle cone pulley.....	4 1/2" and 6 1/2" x 3 1/4"
Size of countershaft drive cone pulley.....	15" and 17" x 3 1/4"
Size of countershaft tight and loose pulley.....	8 1/2" x 4"
Speed of counter, revolutions per minute.....	1,200
Speed of emery wheel, revolutions per minute.....	530
Weight of machine.....	730 lbs.
Weight of counter.....	165 lbs.

SURFACE GRINDER AND GRINDER HEAD COMBINED.



FIG. 11938.

DESCRIPTION FIG. 11939.

This machine is designed for surfacing work not over 12" in width and in different lengths up to 14"; particularly adapted for connecting rods for locomotives and work of that character, but practical for a large variety of surface grinding. A quantity of small sizes of uniform thickness may be surfaced at one time. Each of the emery wheel spindles has an oscillating attachment which not only keeps the face of the wheels true but causes the wheel to cut much faster. The illustration represents the machine with two wheels—one coarse, for quickly removing the metal; the other, fine for finishing. When constructed this way the work may be more economically and rapidly finished to exact size than

OPEN SIDE AUTOMATIC SURFACE GRINDER.



FIG. 11939.

NO. C SQUARE BASE SURFACER.

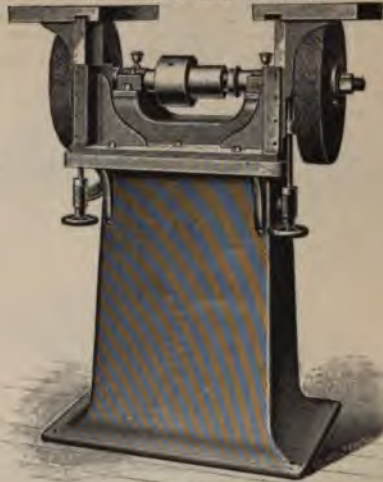


FIG. 11937.

DESCRIPTION FIG. 11936.

The knee is counterbalanced, and when the table has been set approximately by clamping the knee, a fine adjustment through a distance of 1 1/2" may be obtained by the hand wheel.

The bearings are furnished with ring rollers, and provision is made for protecting them from dust and for taking the end thrust of the spindle.

SPECIFICATIONS.

- Diameter of spindle between flanges, 1".
- Pulley, 3 1/2" diameter, 2 3/4" face.
- Table, 14" x 6".
- Vertical movement of table, 9".
- Horizontal movement of table, 8".
- Transverse movement of table, 6".
- A countershaft is furnished with this machine when desired.
- Weight of machine, ready for shipment about 400 lbs.
- Total weight of machine and countershaft ready for shipment, about 575 lbs.

SURFACE GRINDERS.

DESCRIPTION FIG. 11939.—Continued.

by any other method, and it is also accomplished with one operation. By the use of a micrometer feed for the emery wheels (which we furnish when desired) work may be ground to less than a thousandth part of an inch. When desired we manufacture the machine using only one emery wheel. We use an automatic idler on these machines.

SPECIFICATIONS.

Size of emery wheel.....	14" x 4"
Size of emery wheel spindle.....	2"
Size of emery wheel spindle pulley.....	6" x 6"
Height under the wheel.....	5"
Diameter of carriage gang pulleys.....	14" x 21 1/2"
Size of countershaft emery wheel drive pulley.....	24" x 12"
Size of countershaft carriage drive pulley.....	9" x 8"
Size of countershaft pump drive pulley.....	12" x 2"
Size of countershaft tight and loose pulley.....	12" x 3"
Speed of counter, revolutions per minute.....	325
Speed of emery wheel, revolutions per minute.....	1,350
Speed of carriage per minute.....	12"

NO. 1 AUTOMATIC SURFACER.

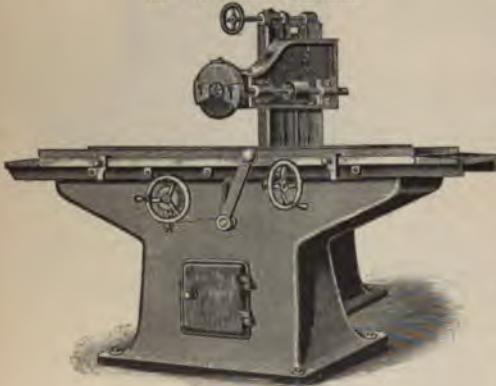


FIG. 11940.

Machine is made in lengths as noted below.

To Grind.....	Floor Space Over All.....	Weight.....
40".....	101" x 60"	5,436 lbs.
50".....	121" x 60"	5,625 lbs.
60".....	141" x 60"	5,806 lbs.
70".....	161" x 60"	5,985 lbs.
80".....	181" x 60"	6,202 lbs.
100".....	221" x 60"	6,500 lbs.
120".....	261" x 60"	6,898 lbs.
144".....	301" x 60"	7,318 lbs.
168".....	361" x 60"	7,750 lbs.

DESCRIPTION FIG. 11940.

Floor space.....	70" x 30"
Size of emery wheel.....	8" x 1/2"
Speed of emery wheel, revolutions per minute.....	2,400
Weight of machine.....	1,200 lbs.
Weight of counter.....	180 lbs.

This machine has a table 35" long and 9" wide, with a working surface 20" long 7" wide, and will surface work 6" thick under an 8" wheel. The travel of the table is automatic and easily changed to feed in either direction. The transverse movement of the wheel is also automatic and may be easily fed in either direction. The spindle, which is hardened steel ground and lapped, runs in brass boxes and is provided with means of compensation for wear. It also has an oscillating attachment which is quickly adjusted to oscillate or not, as circumstances demand; and when oscillating gives the wheel a cross cut similar to a file, which not only serves to obtain fast cutting but a fine surface, and to retain a uniform face on the wheel. The spindle has a No. 3 Morse taper hole in the front end. The wheel head is raised and lowered with hand wheel, also has a micrometer feed graduated to the fractional part of a thousandth of an inch. The table is driven by worm and rack and by the use of a friction clutch the carriage may be stopped or started independent of the balance of the machine. Vises plain or adjustable and index centers are furnished when desired.

DESCRIPTION FIGS. 11941 AND 11942.

This machine is made from new and improved patterns throughout, intended for grinding flat metal surfaces where accuracy is required, or where the work to be ground is hardened so that other methods of truing the faces are difficult.

The machine has a heavy base supporting both table and the wheel directly from the floor, which insures rigidity and prevents vibration. The bed which supports the table has both automatic and hand feed lengthwise with automatic or hand feed crosswise of the table. There is a clutch operated by the lever shown for throwing in and out the automatic feed. This can be done to change the work while the emery wheel and other parts of the machine are running. Adjustable stops are provided to limit the stroke to any desired length. The ways are provided with self-oiling device and are thoroughly protected. The emery wheel spindle is large in proportion to the diameter of the wheel. The bearings are ample and can be adjusted by the use of a wrench to compensate for wear.

The improved machine has a projecting arm which is an integral part of the emery wheel head. The bearings have been lengthened, the spindle increased in diameter. The emery wheel is raised or lowered by hand wheel and screw. This wheel is graduated to thousandths. The automatic cross feed can be arranged to feed at either or both ends of the stroke. The table and bed are provided with suitable guards for the use of water, when pump is supplied with the machine. Each machine has a double countershaft with drum for driving the emery wheel. Cone pulley gives three speeds to the table. Self-oiling boxes and dust protectors are used throughout. Greater adjustment of head can be furnished, if desired.

SURFACE GRINDERS.

DESCRIPTION FIGS. 11941 AND 11942.
Continued.

Size of base.....	38" x 47"
Height of table from floor.....	34½"
Length of bearings.....	6½" and 8"
Diameter of spindle in bearings.....	1½" and 2"
Diameter of spindle between flanges.....	1½"
Size of pulley on spindle.....	5" x 3¼"
Size of emery wheel.....	12" x 1½" x 1½"
Tight and loose pulley on countershaft.....	10" x 5¼"
Speed of countershaft per minute.....	350

IMPROVED AUTOMATIC
SURFACE GRINDER.

FRONT
VIEW.



FIG. 11941.

Machine is built in four lengths, viz.:

- No. 1 machine to grind work 24" x 12" x 9", weight, 3,500 lbs.
- No. 2 machine to grind work 36" x 12" x 9", weight, 3,600 lbs.
- No. 3 machine to grind work 48" x 12" x 9", weight, 4,500 lbs.
- No. 4 machine to grind work 60" x 12" x 9", weight, 4,600 lbs.

If wanted without automatic pump and connections, a suitable allowance is made in the price.

IMPROVED AUTOMATIC SURFACE GRINDER.

SIDE
VIEW.



FIG. 11942.

DESCRIPTION FIG. 11943.

This machine is especially adapted for automatically surfacing locomotive guide bars, also flat surfaces, either singly or in groups, the construction being similar to that of an iron planer. The carriage is driven by a lead screw which produces a fine finish and avoids all chattering effects. It is equipped with dust guards to protect the ways, when the machine is not equipped with water attachments. It has a working surface of 14½" wide, and takes work 12" under the wheel. The carriage is arranged with three T slots unless otherwise specified. The travel is automatic in either direction. The wheel head

NO. 1-A AUTOMATIC PLANER SURFACER.

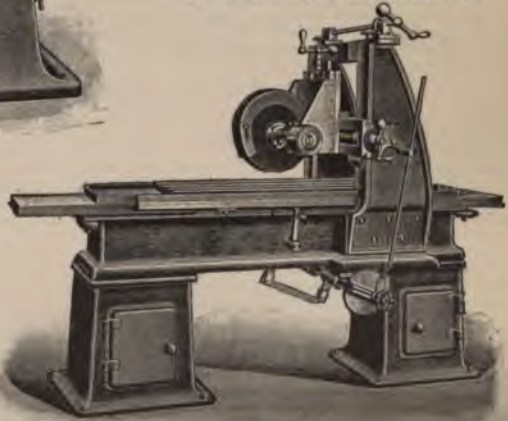


FIG. 11943.

SURFACE GRINDERS.

DESCRIPTION FIG. 11943.—Continued.

has a transverse movement, and can be easily changed to feed automatically in either direction. The spindle is ground and lapped and runs in bronze boxes. The bearings are all fully protected with our patent dustproof collars. The machine is equipped with an automatic idler for adjustment of emery wheel belt.

When required, an oscillating attachment, oscillating the emery wheel from $\frac{1}{4}$ " to $\frac{3}{4}$ " is furnished, giving the emery wheel the cross (or file) cut, keeping the wheel uniform and producing the work much faster. The micrometer down feed on the emery wheel head has an adjustment of less than one-fourth of one-thousandth of an inch.

When specified, the machine is equipped with water attachment, without extra charge, which prevents the work from heating or expanding, and also keeps the dust confined to the machine.

NO. 2 AUTOMATIC PLANER SURFACER.



FIG. 11944.

SPECIFICATIONS FIG. 11943.

Diameter of spindle.....	1 1/4"
Length of spindle bearing.....	4 1/4"
Size of emery wheel.....	10" x 1 1/2"
Size of spindle pulley.....	4 1/2" diameter, 4" face
Size of emery wheel drive drum.....	16" diameter
Size of carriage drive pulley.....	12" x 6" face
Size of pump drive pulley.....	12" x 2" face
Size of tight and loose pulley.....	10" diameter, 5" face
Speed of emery wheel, per minute.....	1,900 revolutions
Speed of counter, per minute.....	450 revolutions
Speed of gang pulleys, per minute.....	600 revolutions
Speed of carriage, per minute.....	8"

To Grind	Floor Space	Weight
2'.....	3' x 7'	2,700 lbs.
3'.....	3' x 9'	2,900 lbs.
4'.....	3' x 11'	3,120 lbs.
5'.....	3' x 13'	3,340 lbs.
6'.....	3' x 15'	3,560 lbs.
7'.....	3' x 17'	3,800 lbs.
8'.....	3' x 19'	4,225 lbs.
10'.....	3' x 23'	4,440 lbs.
12'.....	3' x 27'	5,000 lbs.

DESCRIPTION FIG. 11944.

This machine derives its name from its similarity to an iron planer. It is especially adapted for flat surfaces where but little metal is to be removed and which can generally be finished more rapidly, accurately, and economically by grinding, than by any other method. Work may be ground to a thousandth part of an inch.

The carriage is operated with rack and gear. The emery wheel spindle is ground and lapped, runs in bronze bearings; it also has an oscillating attachment which oscillates the wheel nearly one-half inch, by which the wheel has a cross cut which causes it to remove the metal more freely, also to retain its uniformity. This oscillating attachment can easily be locked out if so desired.

The machine is equipped with water attachments, the bearings are all fully protected from dust. It is made in two different widths and six different lengths.

SPECIFICATIONS.

Diameter of spindles.....	1 1/4"
Length of bearings.....	6"
Size of emery wheel.....	12" x 2"
Size of spindle pulleys.....	12" x 5" and 5" x 3 1/4"
Size of emery wheel drive, drum.....	24"
Size of carriage drive pulley.....	8" x 8"
Size of pump drive pulley.....	12" x 2"
Size of tight and loose pulley.....	12" x 5"
Speed of emery wheel per minute.....	1,600 revolutions
Speed of counter per minute.....	500 revolutions
Speed of gang pulley per minute.....	285 revolutions
Speed of carriage per minute.....	11 1/4"

To Grind, 18" Wide.	Floor Space	Weight.	To Grind, 24" Wide.	Floor Space.	Weight.
4' long.....	30" x 12'	5,000 lbs.	4' long.....	36" x 12'	5,300 lbs.
5' long.....	30" x 14'	5,600 lbs.	5' long.....	36" x 14'	6,600 lbs.
6' long.....	30" x 16'	6,200 lbs.	6' long.....	36" x 16'	7,300 lbs.
8' long.....	30" x 20'	7,400 lbs.	8' long.....	36" x 20'	8,000 lbs.
10' long.....	30" x 24'	8,600 lbs.	10' long.....	36" x 24'	9,400 lbs.
12' long.....	30" x 28'	10,000 lbs.	12' long.....	36" x 28'	10,700 lbs.

MAY 1914

SURFACE GRINDERS.

NO. 4 AUTOMATIC PLANER SURFACER.



FIG. 11945

DESCRIPTION FIG. 11945.

This machine is designed for very fine, close work. Large and small surfaces which are to be brought down to a true and fine finish can be so produced, more rapidly, economically, and accurately by the use of this machine, than by any other method. No pains have been spared in making it a strictly first-class tool in every respect.

The emery wheel spindle is ground and lapped; the bearings are bronze and protected with dustproof collars. The wheel lead has a micrometer feed which admits of a feed less than one-quarter of a thousandth part of an inch. The wheel is quickly raised and lowered by the application of a hand wheel and gears. The carriage is fed by a lead screw in the center of the bed, and is fed by a powerful worm and worm gear. By this device a steady and even motion is obtained and vibration dispensed with, leaving the work with a fine, smooth finish.

All the ways and bearings are protected from dust; the machine is arranged for the use of water, which prevents heating, and exceptionally thin metal may be ground without warping. The machine is especially adapted for grinding thin plates, engraving plates, etc. When desired we arrange an oscillating attachment on the emery wheel spindle which oscillates the spindle $\frac{1}{8}$ " giving the emery wheel better cutting qualities, also aiding in retaining a uniform face. This device can be easily locked out if desired. Price of same is additional.

The machine is made in three different widths and six different lengths, each machine being equipped with an automatic idler.

SPECIFICATIONS.

Diameter of emery wheel spindle.....		1 1/2"
Size of emery wheel.....		14" x 2"
Size of emery wheel spindle pulley.....		5" x 3 1/4"
Size of carriage gang pulleys.....		18" x 2 1/2"
Size of drum for emery wheel drive.....		2 1/2"
Size of drum, tight and loose pulleys.....		12" x 5"
Size of carriage gang (counter) pulleys.....		24" x 10"
Size of pump drive pulleys.....		12" x 2"
Speed of emery wheel, revolutions per minute.....		1,350
Speed of emery wheel drum, revolutions per minute.....		280
Speed of gang pulleys, revolutions per minute.....		533
Speed of gang pulleys counter, revolutions per minute.....		400
Speed of platen per minute.....		8'
To Grind.....	Floor Space.	Weight.
2 1/2' wide.....		
4' long.....	36" x 12"	8,400 lbs.
5' long.....	36" x 14"	9,100 lbs.
6' long.....	36" x 16"	10,000 lbs.
8' long.....	36" x 20"	11,500 lbs.
10' long.....	36" x 24"	12,600 lbs.
12' long.....	36" x 28"	14,600 lbs.
To Grind.....	Floor Space.	Weight.
3 1/2' wide.....		
4' long.....	42" x 12"	8,500 lbs.
5' long.....	42" x 14"	9,300 lbs.
6' long.....	42" x 16"	10,500 lbs.
8' long.....	42" x 20"	12,000 lbs.
10' long.....	42" x 24"	13,400 lbs.
12' long.....	42" x 28"	15,200 lbs.
To Grind.....	Floor Space.	Weight.
4 1/2' wide.....		
4' long.....	54" x 12"	9,000 lbs.
6' long.....	54" x 14"	9,900 lbs.
8' long.....	54" x 16"	10,850 lbs.
10' long.....	54" x 20"	12,700 lbs.
12' long.....	54" x 24"	14,550 lbs.
	54" x 28"	

SURFACE GRINDERS.

NO. 6 AUTOMATIC SURFACER.

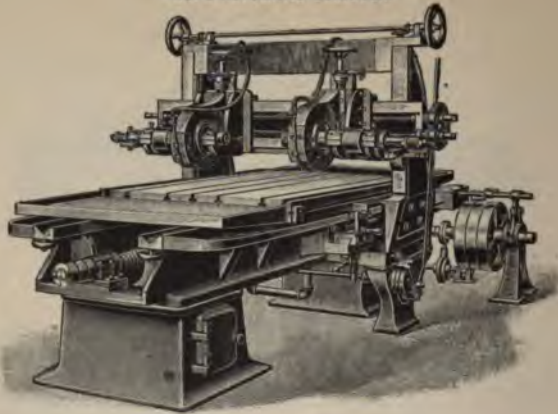


FIG. 11946.

DESCRIPTION FIG. 11946.

This machine is especially designed for surfacing work similar to boiler fronts, safe and vault doors, printers' tables, etc., and is furnished with two wheel heads. As each wheel head has a micrometer feed, large surfaces may be brought to a fine and even surface much more economically than by any other method. The cross rail carrying the wheel heads has a power feed to raise and lower the same, or it may be raised and lowered by hand. The platen is driven by a lead screw and large worm and worm gear, the worm and gear running in an oil tank which is perfectly tight and keeps the wearing parts well lubricated. The bed and platen are arranged so that water is used. The ways and bearings are all fully protected. The emery wheel spindles are ground and lapped and run in bronze boxes. Machine is equipped with an automatic idler.

Upon application, estimates will be furnished with the machine arranged to take in work 40" thick.

Will take work under the wheel.....		15" thick
Diameter of emery wheel spindle.....		2"
Size of emery wheel.....		14" x 14"
Size of emery wheel pulley.....		5" x 5"
Length of emery wheel spindle boxes.....		4 1/2"
Size of counter drum for emery wheel.....		2 1/2"
Size of tight and loose pulleys.....		12" x 5"
Size of carriage gang pulleys.....		18" x 2 1/2"
Size of counter drive gang pulleys.....		24" x 5"
Size of counter drive tight and loose pulleys.....		12" x 5"
Size of counter pump pulley.....		12" x 2"
Speed of emery wheel revolutions per minute.....		1,350
Speed of drum, revolutions per minute.....		530
Speed of carriage counter, revolutions per minute.....		400
Speed of carriage per minute.....		6" 4"
To Grind 48" Wide.....	Flour Syces.....	Weight.....
8' long.....	96" x 16'	13,000 lbs.
8' long.....	96" x 20'	15,000 lbs.
10' long.....	96" x 24'	17,000 lbs.
To Grind 60" Wide.....		
7' long.....	108" x 18'	18,000 lbs.
9' long.....	108" x 22'	20,000 lbs.
11' long.....	108" x 26'	22,000 lbs.
To Grind 72" Wide.....		
8' long.....	120" x 20'	20,000 lbs.
10' long.....	120" x 24'	22,000 lbs.
12' long.....	120" x 28'	24,000 lbs.
To Grind 84" Wide.....		
10' long.....	132" x 24'	25,000 lbs.
12' long.....	132" x 28'	28,000 lbs.
To Grind 96" Wide.....		
10' long.....	144" x 24'	30,000 lbs.
12' long.....	144" x 28'	34,000 lbs.
To Grind 120" Wide.....		
12' long.....	168" x 28'	38,000 lbs.

H. H. W. H. P. O. D. B. H. H. V. E. E. H. H. V. H. H. E. H. H. H.

SURFACE GRINDING AND POLISHING MACHINE.



FIG. 11947.

DESCRIPTION FIGS. 11947 AND 11948.

This machine is designed to grind and polish surfaces of various lengths and widths by means of a solid emery or leather-covered wheel. It has no automatic features, the work being moved by hand.

The illustration shows the platen with a carefully ground, ribbed surface placed above the wheel. The platen is webbed on the under side and supported on strong columns. It is cut across the center on a line with the spindle of the wheel, and each part may be raised or lowered independently of the other by means of a pair of bevel gears operated by a crank. This device enables the operator to move the tables rapidly, and at the same time allows a very delicate adjustment, which is necessary when but a slight portion of the work is to be removed. The tables may be clamped securely at any point by means of split sleeves. These separately adjustable tables prevent irregularities in the finished surface, as the receiving table takes the work at the proper height, obviating any rocking motion. This device also relieves the spindle of any unnecessary weight.

The bearings are provided with dust protectors. In order to accommodate wider wheels provision is made for placing a spider frame on the outside of the machine. By this arrangement, which may be attached to any standard machine, wheels 18" wide are sometimes used.

A throat piece is let into the table flush with the top, and can be adjusted to conform to any width of wheel. The wheel is fastened between collars on the outside of the bearings close to the boxes, which have a very long bearing surface and large diameter.

DIMENSIONS.

Diameter of wheel.....	15" to 24"
Width of wheel on regular machine, up to.....	8" width, 2½" hole
Width of wheel with spider frame, up to.....	18" width, 3" hole
Height of table from floor when lowered.....	31½"
Height of table from floor when raised.....	36"
Size of table.....	29" x 64"
Floor space.....	36" x 58"
Pulley on spindle.....	10" x 6"
Bearings.....	7" x 2½"
Diameter of spindle between flanges.....	2½" or 3"

COUNTERSHAFT.

The countershaft for use with this machine has tight and loose pulleys 12" x 6", driving pulley 24" x 6". It should run, when using 24" emery wheel, about 350 revolutions per minute, and when using a wood polishing wheel 500 revolutions per minute.

WEIGHTS.

Machine and countershaft, about.....	2,400 lbs.
Machine only, about.....	2,200 lbs.
Countershaft only, about.....	200 lbs.



FIG. 11948.

FACE GRINDING MACHINE.



FIG. 11949.

DESCRIPTION FIG. 11949.

This machine is designed to do grinding where but a small amount of stock is to be removed and where a flat surface is required. The head carries a cylinder wheel 14" in diameter, held on the end of a heavy steel spindle, running in long bearings, securely protected from emery dust. The wheel is held in the adjustable cylinder wheel holder. The head and wheel is brought to the work with automatic power feed as well as by hand feed. The automatic feed is regulated from $\frac{1}{16}$ " up to $\frac{1}{4}$ ". The table travels upon accurately finished ways, protected from emery dust, and may be moved by hand or by automatic power feed, the length of movement being controlled by dogs engaging a shifting lever.

Each machine is supplied complete with emery wheel, adjustable cylinder wheel holder, automatic cross feed, automatic pump and connections, and countershaft.

WEIGHTS.

No. 1 machine complete with countershaft, about.....	2,300 lbs.
No. 2 machine complete with countershaft, about.....	2,400 lbs.
No. 3 machine complete with countershaft, about.....	2,500 lbs.
No. 4 machine complete with countershaft, about.....	2,800 lbs.
No. 5 machine complete with countershaft, about.....	3,750 lbs.

No. 1 DOUBLE WHEEL FACE GRINDING MACHINE.

DESCRIPTION FIG. 11950.

This is one of the many machines we make for special purposes.

It is used to grind the ends of spiral springs, faces of wrenches or other work where it is required to have two surfaces perfectly parallel to each other. As both surfaces are ground at the same time, there is a great saving of time and labor. It is arranged so that the wheels can pass over the top of the cross slide.

The emery wheels are brought toward each other independently or together by means of a screw moved by a worm gear attached to shaft of the hand wheel, clutches being used to throw either emery wheel head into or out of gear as desired.

The work is fastened to a cross slide which is moved by means of the lever shown.

The emery wheels are held in our adjustable cylinder wheel holder.

The dimensions given are for the standard machine, but they may be varied to suit different requirements.



FIG. 11950.

SPECIFICATIONS.

Length of bed as ordered.....	5' or 6'
Height, floor to center spindle.....	45"
Bearings, cast iron.....	5½" long, 1½" diameter
Size of pulley.....	8" diameter, 3" face
Emery wheel.....	14" diameter, 3½" face, 12" hole
Greatest distance between wheels.....	5" bed, 12"
Greatest distance between wheels.....	6" bed, 24"
Least distance between wheels, as shown in cut.....	4", also made 1"
Traverse of cross slide.....	4"

COUNTERSHAFT.

The countershaft made for use with this machine has tight and loose pulleys 10" by 5¼", driving pulleys 16" by 12", deep at hangers, 12". It should run about 325 revolutions per minute.

THE PATENT STEEL MILL

UNIVERSAL FACE AND ANGLE GRINDING MACHINE.

DESCRIPTION FIG. 11951.

This machine is well adapted to a large variety of grinding, where but a small amount of stock is to be removed, and a flat true surface is desired. The pieces to be ground may be held in suitable fixtures fastened to the platen, or clamped to the platen itself.

The platen has a longitudinal movement by means of a hand wheel sufficient to grind pieces 12" long. It has a knee furnished with angle irons adjustable on platen, and moves laterally by hand to the annular wheel as the latter is worn away. It has sufficient length to keep the slides or wearing parts of the machine always covered.

The table or platen is adjustable to any degree or pitch, and furnished with a graduated index finger, enabling the operator to set and reset it upon the same angle to grind beveled surfaces alike and true.

The head carries a cylinder wheel on one end of spindle 12" in diameter. The other end of spindle is provided with taper hole and arbor, the latter arranged to hold a wheel 9" diameter for light tool grinding.

COUNTERSHAFT

The countershaft made for use with this machine has tight and loose pulleys 8" x 3 1/4", driving pulley 18" x 4 1/4", drop of hangers 12". It should run about 275 revolutions per minute.

WEIGHT

Machine complete with countershaft, about 1,000 lbs.

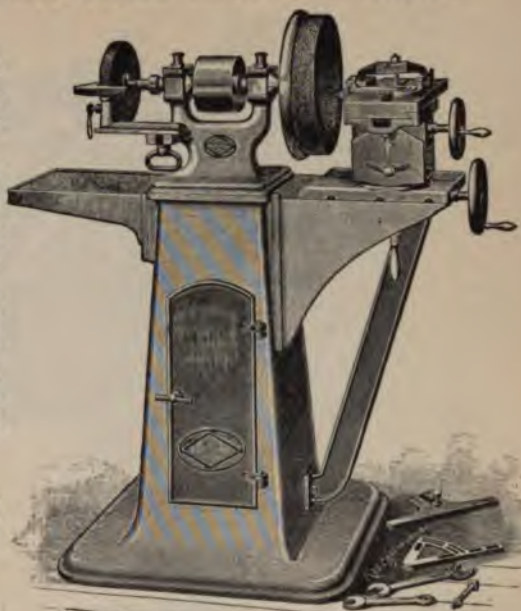


FIG. 11951.

NO. 25 END GRINDER.

DESCRIPTION FIG. 11952.

This machine is designed especially for constructional iron and safe work. Longer tables may be constructed by the purchaser if desired, or tables may be arranged on the angle for accurately jointing bevels. When desired the machine is also arranged with automatic feeds.

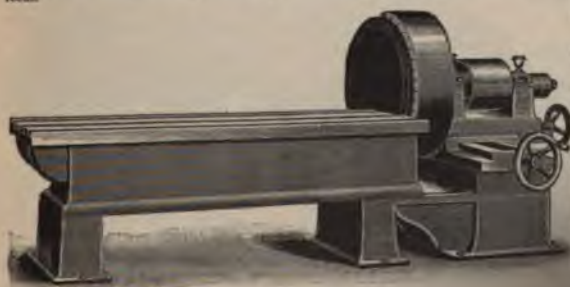


FIG. 11952.

Entire length of machine over all.....	9' 3"
Entire width of machine over all.....	3' 3"
Length of bed.....	5' 7"
Traverse of emery rim...	12"
Size of emery rim.....	19 1/2" x 6" x 2"
Diameter of spindle.....	2 1/4"
Size of spindle pulley....	9" x 8"
Size of countershaft drive pulley.....	24" x 14"
Size of tight and loose pulley.....	12" x 5"
Speed of emery rim, revolutions per minute....	1,000
Weight of machine.....	3,000 lbs.

RING WHEEL GRINDERS.

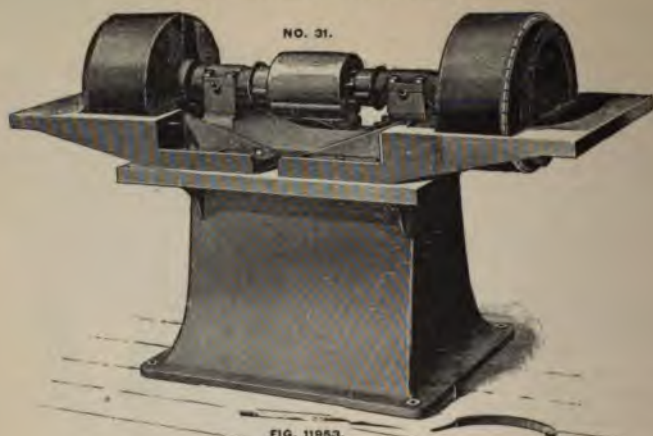


FIG. 11953.

DESCRIPTION FIG. 11953.

This grinder is arranged with a chuck, which admits of a high speed with perfect safety, and is designed for grinding heavy work where flat surfaces are required.

Floor space	37" x 30"
Height to center of spindle	33½"
Length of spindle	44"
Length of self-oiling bearings	8"
Diameter of spindle in bearings	2½"
Diameter of spindle in chuck	2"
Size of emery rims	15½" x 5" x 2"
Distances between chucks	32"
Size of pulley on spindle	9" x 8"
Size of countershaft pulley	24" x 8"
Tight and loose pulleys	12" x 5½"
Speed of counter, revolutions per minute	450
Weight of machine without wheels	1,400 lbs.
Weight of counter	450 lbs.

DESCRIPTION FIG. 11954.

This machine is designed for edge grinding by hand where the short, rapid movement is required without the delay of starting and stopping the power. Angle irons and different devices may be easily fastened to the slotted table and a large variety of work ground. It is made with one table or two, as represented by the cut. The table is 30" long, 14" wide and has a feed motion of 2" toward the wheel and a movement of 3-4" in front of the wheel. The bed has an adjustment by means of a screw and hand wheel. The movement of the platen is controlled by the large hand wheel.

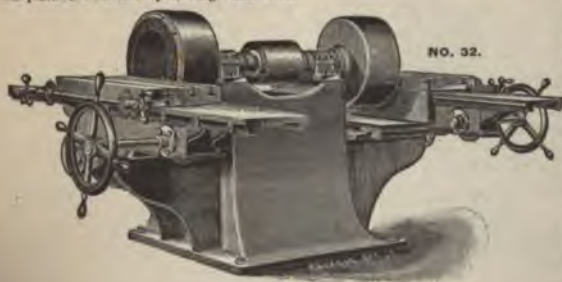


FIG. 11954.

Length of machine over all	8' 3"
Width of machine over all	6' 4"
Height from floor to platen	2' 2"
Length of platen	6' 2"
Entire length of bed	3' 8½"
Size of emery rim	15½" x 6" x 2"
Size of spindle pulley	9" x 8½"
Size of driving pulley on counter	24" x 8"
Size of tight and loose pulley on counter	12" x 5½"
Speed of counter, revolutions per minute	450
Speed of emery rim, revolutions per minute	1,225
Weight of machine	4,100 lbs.
Weight of counter	425 lbs.

CIRCULAR PLATE AND WASHER GRINDING MACHINE.

DESCRIPTION FIG. 11955.

This machine will be found useful for grinding disks and washers. A 14" magnetic chuck, which is controlled by a friction clutch, is mounted on the column at the back of the machine. The wheel head mounted on the table takes a 12" x 1" emery wheel. The hand wheel moves the chuck head to the emery wheel and allows an adjustment of .001". The table has both hand and power feed, with automatic reverse at the end of each stroke. For instantly starting or stopping the table, the lever shown on the front of the machine is used. By means of the crank the table can be operated by hand. The machine is usually supplied with automatic pump and connections, which throws water on the wheel directly in front of the work.

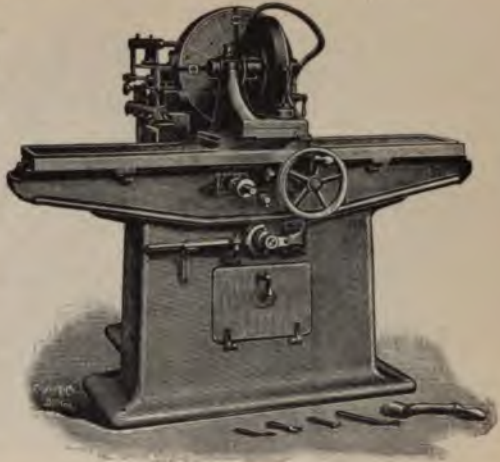


FIG. 11955.

SPECIFICATIONS.

Size of base of column.....	30" x 40"
Height from floor to center of spindle.....	39 1/2"
Length of wheel spindle.....	10 1/2"
Diameter in bearings.....	1 1/2"
Distance between flanges.....	1 1/2"
Length of bearings.....	3 3/4"
Size of pulley.....	2 1/4" x 2 1/4"
Length of ways.....	11"
Length of chuck spindle.....	24 1/2"
Diameter of spindle in bearings.....	1 1/4"
Length of front bearing.....	5 1/2"
Length of rear bearing.....	5"
Diameter of chuck.....	14"
Size of pulley.....	8" x 5 1/2"
Weight of machine complete with chuck and countershaft.....	2,200 lbs.

CAR BOX GRINDING MACHINE.

DESCRIPTION FIG. 11956.

This machine is designed to grind car boxes or other work requiring straight, finished surfaces. It will grind economically up to the limit of the machine in a true and rapid manner. It is intended to run an ordinary emery wheel on one end and a cylinder wheel as shown on the other. The cylinder wheel is 22" diameter, 4 1/2" face, 19 1/2" hole. The table is 36" long by 13" wide. The longitudinal travel is 19" and the transverse movement is 6". The vertical adjustment of the table is 8". The machine has a steel spindle, removable cast iron boxes, arms for rests both front and back. The bearings have a dust excluding device, and are provided with nickel-plated oil cups.

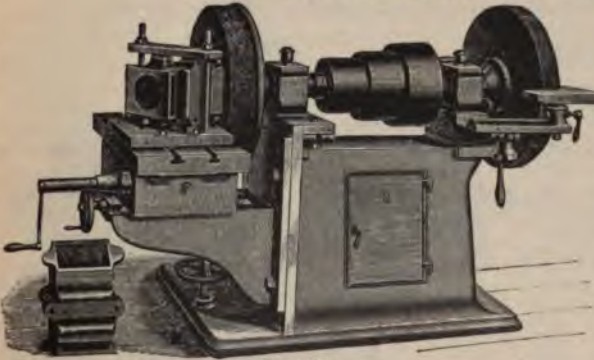


FIG. 11956.

SPECIFICATIONS.

Size of base.....	26" x 38 1/4"
Height from base to center of spindle.....	33"
Length of bearings, each.....	8 1/2"
Diameter of spindle in bearings.....	2 1/4"
Diameter of spindle between flanges.....	2 1/4"
Size of cone pulley on spindle.....	6", 10" and 12" x 5 1/4"
Distance between wheels.....	40"

COUNTERSHAFT.

Countershaft has tight and loose pulleys 10" diameter by 5 1/4" face, and should run 475 revolutions per minute.

84" GUIDE BAR GRINDING MACHINE.



FIG. 11957.

DESCRIPTION FIG. 11957.

This machine was recently built for one of the large railroads and will take work up to 84" in length by 6" in width.

It has a 30" cup wheel, held in an adjustable wheel holder.

The bearing and working parts are thoroughly protected from dust. Arrangement is made for ample lubrication. An abundant supply of water is provided for the work, thus keeping it cool at all times.

The machine is fitted with automatic longitudinal and cross feeds, and is capable of fine adjustment. It has an adjustable or swivel head, which allows the operator to do concave as well as flat grinding.

Parts of this machine are carried in stock and can be quickly assembled on receipt of order.

SMALL SPINDLE AND ROLL GRINDING MACHINE.

DESCRIPTION FIG. 11956.

This machine is designed for grinding small rolls and spindles used in cotton, woolen or silk machinery, whether straight or taper.

The head stock has tight and loose pulleys with belt shifter attached, and the tail stock spindle has movement by lever, being kept to the work by a spring.

The emery wheel is driven by two belts, giving sufficient power, and is moved to the work by a large hand wheel, which is graduated to give a movement of $\frac{1}{16}$ ".

The table travel is easily reversed at any point by use of the lever shown, while the crank is used to run the table by hand. A plentiful supply of water is furnished by means of a pump and connections.

The height from bases of the head and tail stocks to center of spindle is 33 $\frac{1}{2}$ ".

DIMENSIONS.

Size of base of column.....	39" x 40"
Height from floor to center of spindle..	39 $\frac{1}{2}$ "
Length of bearings, each.....	5 $\frac{1}{2}$ "
Diameter of spindle in bearings.....	1 $\frac{1}{2}$ "
Diameter of spindle between the flanges.....	1 $\frac{3}{4}$ "
Size of driving pulley.....	8" x 4 $\frac{1}{4}$ "
Size of emery wheel, either 16" x 13 $\frac{1}{2}$ " x 13 $\frac{1}{4}$ " or 20" x 15 $\frac{1}{2}$ " x 13 $\frac{1}{4}$ ".	

WEIGHTS.

20" machine complete, shipping weight about.....	3,000 lbs.
30" machine complete, shipping weight about.....	3,200 lbs.
36" machine complete, shipping weight about.....	3,300 lbs.
42" machine complete, shipping weight about.....	3,400 lbs.



FIG. 11956.

HEAVY ROLL GRINDING MACHINE.

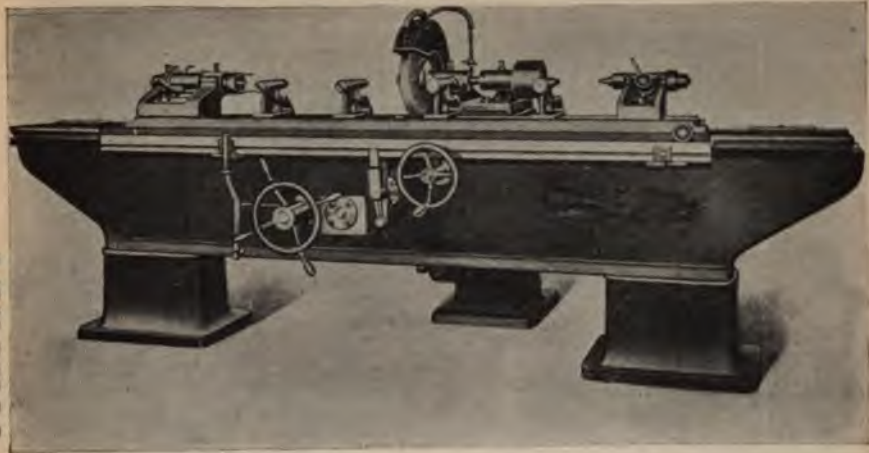


FIG. 11959.

DESCRIPTION FIG. 11959.

The machine shown above is designed for straight cylindrical and taper grinding. The bed is deep and well ribbed, and the ample weight gives great rigidity. This machine has flat ways undercut 30°, the carriage being kept in alignment by a gib on the front side. The top platen of the carriage swivels, and provision is made to adjust it at the right-hand end.

The head stock, which has tight and loose pulleys with a belt-shifting attachment, is designed to grind upon live or dead centers.

The tail stock has a spring center, and a number of adjustable spring back rests are provided to support slender work. Varying speeds are available for rotating the work, and three grinding speeds are arranged for.

The large hand wheel on the front of the machine operates the table by hand and the small lever at the left of this wheel throws the table mechanism in and out of gear, starting or stopping the table instantly.

The base supporting the wheel head is heavy and contains a reservoir for water to which the automatic pump is attached.

The spindle is tool steel, hardened and ground, and runs in bronze boxes adjustable for wear.

The wheel head is moved to the work by the small hand wheel and is adjustable on the saddle to allow for the wear of the emery wheel.

The cross feed has been given careful attention; one tooth of the ratchet varies the distance between the wheel and work by .0005".

The height from bases of the head and tail stocks to center of spindle is 35¼". A larger swing can be provided, if desired.

This machine is made in sizes from 50" to 144".

Parts of this machine are carried in stock and they can be quickly assembled on receipt of order. Size of emery wheel 16" diameter by 1½" face.

WEIGHTS.

50" machine complete, about.....	3,800 lbs.
60" machine complete, about.....	4,000 lbs.
72" machine complete, about.....	4,600 lbs.
84" machine complete, about.....	5,200 lbs.
96" machine complete, about.....	5,700 lbs.
108" machine complete, about.....	

ROLL GRINDERS.

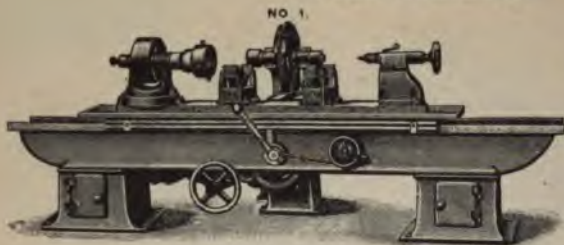


FIG. 11980.

that may occur, and are of phosphor bronze. The emery wheel may be fed to the work automatically or by hand and may be adjusted to $\frac{1}{16}$ "s. The machine is made in three different lengths and will weigh 18"

DESCRIPTION FIG. 11980.

This machine is especially designed for grinding small sheet metal rolls, four mill paper rolls, etc. The head stock spindle and may be turned to any angle of 90° with the emery wheel for grinding slitter cutters and metal disks. Water attachments are provided; the emery wheel fed as well as the platen feed is automatic. The construction of the machine is for the work to travel in front of the wheel. By this construction very accurate work may be obtained. The carriage is driven by a train of gears and may be started or stopped by a friction gear independent of the balance of the machine. The carriage is equipped with adjustable saddles for grinding rolls on the bearings, and driven by a wabber. The emery wheel bearings are made adjustable, to take up any wear

SPECIFICATIONS.

Diameter of head-stock spindle.....	3 1/2"	
Length of bearings.....	4"	
Diameter of emery wheel spindle.....	1 1/2"	
Length of bearings.....	4"	
Size of emery wheel spindle pulley.....	5" x 4"	
Size of countershaft emery wheel drive.....	16" x 4"	
Size of countershaft tight and loose pulley.....	12" x 5"	
Size of drum for carriage drive.....	6"	
Size of emery wheel.....	16" x 1"	
Size of tight and loose pulley on drum.....	9" x 4" and 10" x 4"	
Speed of emery wheel counter, revolutions per minute.....	380	
Speed of emery wheel, revolutions per minute.....	1,225	
Speed of carriage per minute.....	14"	
Speed of rolls, revolutions per minute.....	125 to 150	
To Grind Between Centers.....	Floor Space Over All.....	Weight.....
36".....	42 x 126"	4,882 lbs.
48".....	42 x 150"	5,000 lbs.
60".....	42 x 174"	5,420 lbs.

DESCRIPTION FIG. 11981.

This machine is designed to grind flour mill, calender, and all large heavy rolls up to 10' long and 20" in diameter, and if required can be made to grind work 30" in diameter. The carriage is constructed with "V" ways, is operated by a screw connected by a worm and worm gear, which secures a steady and accurate motion. It is also provided with saddles for grinding rolls on the bearings; the saddles are adjustable, having a horizontal and vertical adjustment. The head and tail stocks are both adjustable. Taper, concave, or convex rolls may be accurately ground. The shipping device is positive and admits of grinding to the shoulder. The machine carries two emery wheels opposite to each other and when desired are operated with micrometer feed. The emery-wheel bearings are made of phosphor bronze and are adjustable, and protected by patent dustproof collars. When desired, the machine is arranged with back gears for driving work on dead center. A wabber is provided for grinding rolls on adjustable saddles. The construction of the machine is for the table or work to travel in front of the wheels traveling along the work. It is also equipped with water attachments. This machine is made in five different lengths.

SPECIFICATIONS.

Diameter of lead screw.....	2 1/2"
Diameter of gang pulleys.....	18" x 2 1/2"
Size of emery wheels.....	14" x 1 1/2"
Emery wheel spindle pulley.....	6" x 3"
Diameter of drum for driving roll.....	6 1/2"
Speed of drum for driving roll, revolutions per minute.....	400
Diameter of emery wheel drive pulley.....	20" x 4"
Speed of emery wheel, revolutions per minute.....	1,225
Speed of roll, revolutions per minute.....	3
Speed of carriage, per minute.....	6"

To Grind Between Centers.....	Floor Space Over All.....	Weight.....
72"	78" x 186"	11,360 lbs.
84"	78" x 210"	12,523 lbs.
96"	78" x 234"	13,650 lbs.
108"	78" x 258"	14,765 lbs.
120"	78" x 280"	16,000 lbs.

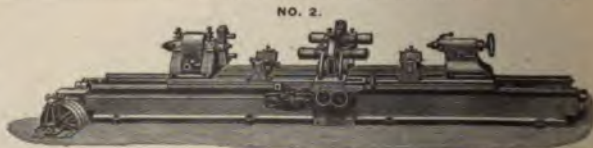


FIG. 11981.

NO. 3 ROLL GRINDER.

DESCRIPTION FIG. 11962.

This machine is especially adapted for four mill, calender, and other heavy rolls up to 10' long between centers. The regular machine will swing 22" in diameter and when desired can be arranged to swing 36" in diameter. The emery wheel heads have a transverse travel, and unlike the No. 2 machine the head and tail stock are stationary. The carriage carrying the emery wheel heads is operated by a screw. The tail stock is provided with a cross feed, as well as the saddle with a cross and vertical feed, which admits of grinding concave, convex, or tapered rolls. The head stock is arranged for four different speeds while the carriage has three. The carriage may be easily operated by hand. The bed has a bottom making a water tight and is used as a water tank, the pump supplying the wheels. The machine is furnished with complete countershafts and overhead drum, and when desired is arranged with back gears for a larger variation of speed, and is arranged to grind on live or dead centers as occasion may require, a wabblers being furnished with each machine. The shipping device is positive and admits of grinding to the shoulder. The emery wheel bearings are made of phosphor bronze and are adjustable. Bearings and ways are fully protected from dust.



FIG. 11962.

Diameter of lead screw.....	2 1/2"	
Size of gang pulleys.....	14" x 2 1/2"	
Size of gang pulley drive.....	12" x 8"	
Size of emery wheels.....	16" x 1 1/2"	
Size of emery wheel spindle pulley.....	5" x 6"	
Size of emery wheel drum.....	24"	
Size of drum, tight and loose pulleys.....	12" x 5"	
Speed of drum, revolutions per minute.....	255	
Speed of emery wheel, revolutions per minute.....	1,225	
Size of head stock cone.....	16" and 13" and 10" and 7" x 4"	
Speed of counter for rolls, revolutions per minute.....	20	
Size of tight and loose pulleys.....	12" x 5"	
Revolution of rolls.....	4 changes, 8 to 46 per minute	
Speed of counter for carriage drive, revolutions.....	75	
Speed of carriage per minute.....	6"	
To Grind Between Centers.....	Floor Space Over All.....	Weight.....
72".....	66" x 174"	9,800 lbs.
84".....	66" x 186"	10,600 lbs.
96".....	66" x 198"	11,050 lbs.
120".....	66" x 222"	12,300 lbs.
144".....	66" x 246"	13,500 lbs.

NO. 5 UNIVERSAL AND SHAFTING GRINDER.

DESCRIPTION FIG. 11963.

This machine is designed for grinding large, heavy cylindrical work similar to piston rods, shafting, etc. The emery wheel spindles are ground and lapped and run in phosphor bronze boxes. The emery wheel carriage travels by the means of a lead screw through the center of the bed connected with a split nut to be opened or closed at will, which admits of the carriage being freely operated by hand. The head stock has a three-step cone pulley and the machine may be back-gear'd if necessary, giving a large number of plates. The tail stock is provided with a cross feed and by the introduction of a fine screw a very fine adjustment may be obtained. The machine has an attachment for grinding tapered work. It is furnished with one wheel and a steady rest, or two wheels as desired. An extra axial lead is furnished to run on the carriage opposite chuck, arranged to carry small wheels for internal grinding. Plates and chucks are furnished (if required) at extra price.

Machine will receive work up to.....	16" in diameter
Size of spindle in head and tail stock.....	2"
Size of emery wheel.....	16" x 1"
Diameter of emery wheel spindle.....	2"
Length of emery wheel spindle bearings.....	4"
Speed of emery wheel, revolutions per minute.....	1,225



FIG. 11963.

To Grind Between Centers.....	Floor Space.....	Weight.....
72"	30" x 124"	6,000 lbs.
84"	30" x 136"	6,500 lbs.
96"	30" x 144"	7,000 lbs.
108"	30" x 156"	7,500 lbs.
120"	30" x 168"	8,000 lbs.

44" CAR WHEEL GRINDING MACHINE.

SIDE VIEW.



FIG. 11964.

The grinding-wheel spindles, boxes and wheel head are made in the most thorough and careful manner, for the extraordinarily heavy service they are called upon to perform.

The operation of that part of the wheel slide that travels parallel with the face of the car wheel is automatic. There is an arrangement to prevent the operator from stopping the slide in the wrong position as related to the flange on the car wheel. When he desires to stop the traverse of the grinding wheel across the face of the car wheel, it is done by turning a small handle, shown near the water hose at the left of the front view. There is one of these handles at either side of the center for either slide. There is also an arrangement by which the revolution of the car wheel can be stopped accurately in the correct position for removing it from the worm wheel or drive bearing. The uprights for carrying the car axles while grinding are adjustable for either car wheels or engine-truck wheels.

These machines are in use by the Pennsylvania Railroad Company, and are giving excellent satisfaction.

These machines are equally suitable for grinding street car wheels. The advantage of having these wheels round so as to run smoothly and be free from flat spots is very great.

To drive the car-wheel grinder, a 30 horse-power constant-speed motor is required. Weight of grinder 31,000 lbs.

DESCRIPTION FIGS. 11964 AND 11965.

This machine will grind car wheels up to 44" diameter, and engine truck wheels up to 36" diameter. It is arranged with water pump and tank to supply 80 gallons of water per minute, 40 gallons on each wheel. The wheels are ground perfectly true while revolving on their own journals, the error from accuracy not exceeding .002" or .003". New chilled wheels are ground and wheels that have been in service are reground, removing flat spots, whether they be chilled wheels or steel-tired wheels. New steel-tired wheels are ground perfectly true after turning. New chilled wheels and reground wheels are finished on this machine at the rate of from 20 to 23 pairs per day of ten hours; new turned steel wheels, at the rate of 23 to 25 pairs per day.

While this machine is intended for wheels that need to be true, that is, for passenger service, it will be found that freight wheels ground in this way will cost little if any more than when ground by the old methods, that is, before placing them on the axles. In addition, they will be perfectly round and concentric, thereby preventing flat spots, as there is no high place for the brake to catch.

This machine is constructed on the most modern lines, and is so proportioned that the parts are durable under hard usage. By the method of grinding employed and the great rigidity of the machine, accuracy is secured with a minimum expenditure of power and a maximum economy of time. The machine is furnished belted complete as shown in the cut; also with its two grinding wheels that are made especially for this work. The arrangement of overhead works is such that a crane can pass over the machine and the work be lifted in and out of the journals. The cut shows a pulley on the overhead works for connection with either a main line or a motor located in any convenient position. If desired, the machine can be furnished with a motor mounted on the column, and connecting with the shaft by a Morse chain.

FRONT VIEW.

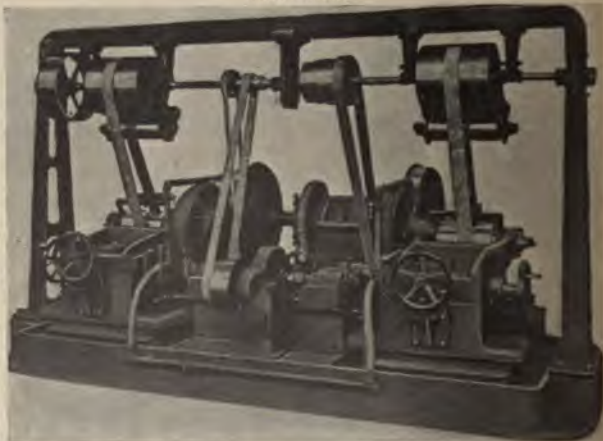


FIG. 11965.

SWING FRAME GRINDING AND POLISHING MACHINE.

DESCRIPTION FIG. 11966.

This machine is to be suspended from overhead, and is especially adapted for use in foundries, large machine shops, architectural iron works and safe manufactories.

It meets the requirements for a machine where it is more convenient to take the wheel to the work than the work to the wheel.

The work can be placed on the floor, bench, or truck and the emery wheel may be swung at will to conform to the surface. The wheel being driven by a swinging countershaft and suspended by a telescopic rod with a universal joint, may be carried to the work or swung at the pleasure of the operator. The frame carrying the wheel is balanced by means of weights, as shown in cut. This arrangement makes it easy to twist the wheel over to any angle and gives any range of movement up or down.

Fitted with a circular wire scratch brush, its value in the cleaning room of a foundry is readily apparent to those familiar with the old laborious hand process.

The machine is valuable for grinding off fine spurs, and imperfections, and leaves the casting looking well. By using a polishing wheel, work can be brought to a fine polish.

It will carry a wheel up to 16" x 3 1/2".
When ordering it is necessary to give height from floor to ceiling of shop.

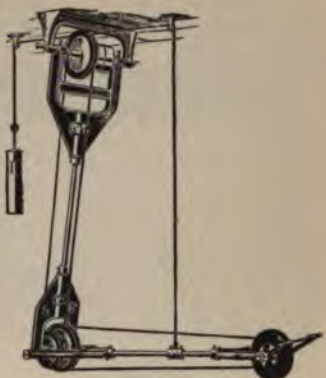


FIG. 11966.

DIMENSIONS.

Diameter of a spindle.....	1 1/2"
Diameter of spindle in bearings.....	1 3/8"
Diameter of shaft.....	1 1/2"
Diameter of sheave wheels.....	6"
Tight and loose pulleys.....	8" x 3"
Diameter of countershaft spindle.....	1 1/2"

WEIGHT.

Machine.....	400 lbs.
--------------	----------

FIVE WHEEL GRINDING MACHINE.

DESCRIPTION FIG. 11967.

This machine is made for grinding molding tools, cutters and other work where different shapes are to be ground. Various shapes of emery wheels can be furnished, but unless otherwise ordered, we send the following, which are all 9" diameter:

One each, 1" face, 3/4" face, 1/2" face, 3/8" face with 1 1/2" hole, and one 1/4" face with 1" hole.

A saw-sharpening attachment is furnished with this machine. The rests are adjustable and can be used with any size wheels up to the capacity of the machine.

The two heads carrying the spindle are fastened to an iron table, which is mounted on legs when desired.

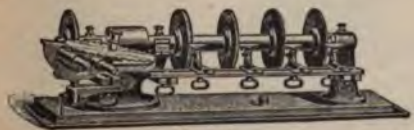


FIG. 11967.

Size of table.....	14 1/2" x 61 1/2"
Height from table to center of spindle.....	8 1/4"
Diameter of spindle between the flanges.....	1" and 1 1/2"
Distance between wheels.....	6"
Entire length of spindle.....	46 1/2"
Size of pulley on spindle.....	4 1/2" x 3 1/4"

WEIGHTS.

Machine with emery wheels, saw-sharpening attachment and countershaft, mounted on legs.....	450 lbs.
Machine with emery wheels, saw-sharpening attachment and countershaft.....	350 lbs.
Machine with emery wheels and saw-sharpening attachment only.....	275 lbs.
Countershaft only.....	70 lbs.

NO. 2 INTERNAL GRINDER.



FIG. 11968.

DESCRIPTION FIG. 11968.

WEIGHT.	25 lbs.
Machine.....	
The "....."	
work of.....	
out my.....	
cut.....	

—a design, on which delicate motion. It is furnished with 1/2" stroke.

INTERNAL GRINDING MACHINE.



FIG. 11969.

Length of bed	80"
Height from floor to center of spindle	41 1/2"
Cone pulley on chuck spindle	4 3/4", 6 1/2", 8 1/4", and 10" x 2 1/2"
Diameter of chuck spindle in bearings	1 3/8"
Size of pulley on emery-wheel head	1 1/2" x 1 1/4"

COUNTERSHAFT.

The countershaft for this machine has tight and loose pulleys 8" diameter, 3 1/4" face. It should run about 500 revolutions per minute. Weight, machine and countershaft about 800 lb.

NO. 3 INTERNAL GRINDER.

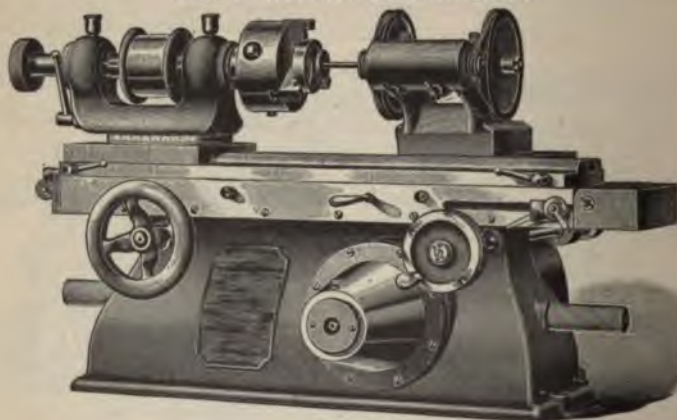


FIG. 11970.

DESCRIPTION FIG. 11970.

There is progress everywhere, but one of the greatest strides that has been made during the past few years in the art of grinding is here shown.

One of our mechanical experts has been for several years at work on what some of the finest mechanics have thought to be an impossibility, viz.: the production of a linear speed for inside grinding as great as is already produced for outside grinding. This we have accomplished, and are now able to attain any speed from 10,000 to 100,000 revolutions per minute; but in devising a bearing to

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NO. 3 INTERNAL GRINDER.

DESCRIPTION FIG. 11970.—Continued.

stand this great speed lay one of the difficulties to be overcome. Everybody is aware, of course, that it is the speed at which a wheel is run that gives to it its ability to cut, and that the quicker it can be run, the better and more quickly it does its work. We can now grind a hole $\frac{1}{16}$ " in diameter, as true and as easily as we can a larger hole. For small holes we use a steel plug charged with diamond powder instead of emery.

For all such work as gauges, automobile bearings, rollers for sewing machines, and in fact anything which has to be ground accurately, quickly, and at a minimum cost, this machine is just the thing.

In addition to the matter of speed, this machine has several other interesting features.

The automatic reciprocating motion is regular and controlled by a patent device; it is adjusted so that the length of the stroke will not vary $\frac{1}{16}$ " from one stroke to another. The carriage is arranged so that the slide can be disengaged, and the head pushed back for testing the work without removing it from the machine; this can be done and the carriage re-engaged in a moment.

The head is adjusted on a swivel, the base of which is graduated, allowing grinding to be done at any angle.

Automatic cross feed and stop is also furnished with this machine.

NO. 6 INTERNAL GRINDER.

DESCRIPTION FIG. 11971.

This machine is built on the same lines as our No. 3, its increased capacity being the principal difference, and where anyone has much internal grinding to do, this machine will pay for itself in a very short time. It is covered by numerous patents. We should be pleased to refer any intending purchasers to parties who have this machine in use so that it may have an opportunity to speak for itself.

Capacity for internal grinding, from $\frac{1}{4}$ " up to 6" in diameter, and up to 6' in length. The stroke can be varied by thousandths of an inch to any size within its capacity.

Any angle up to 45° can be ground as accurately and true as straight work.

The machine is furnished with one of our fast-speed grinding spindles, with the "Rivett" type of bearing. We have some of these spindles which have been running ten hours a day for the last two years, without any repairing, and they are running to-day as well as when first put in.

The reciprocating mechanism is so laid out that as the center of the stroke is approached—that is, as the wheel cuts toward the middle of the work—the rate of traverse is slightly retarded, the movement being correspondingly accelerated immediately the central point is passed, thus obviating any tendency there may be for the wheel to cut smaller at the center of the bore, and at the same time allowing a coarser rate of feed to be employed.

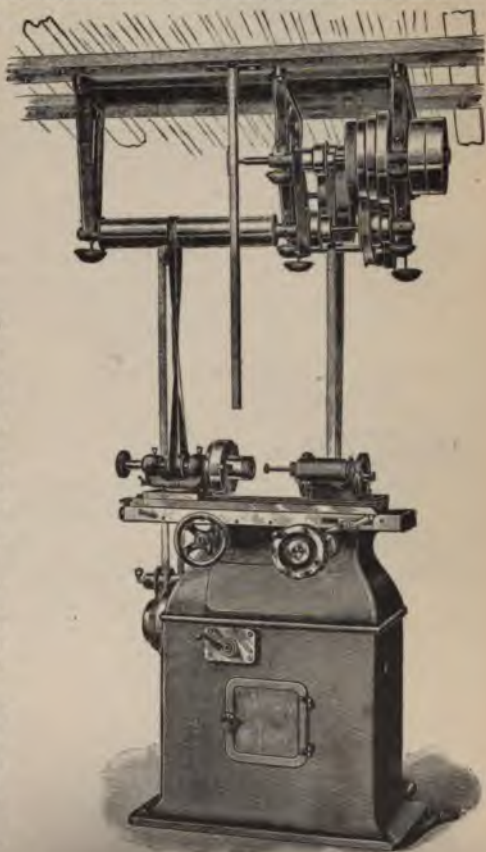


FIG. 11971.

NO. 6 INTERNAL GRINDER.

DESCRIPTION FIG. 11971.—Continued.

The reciprocating block is attached to the table by a clamp, and by releasing it the table may be stopped at once, without stopping the machine, and may be run back by hand for admission or inspection of work. A stop is provided at the left end of the table and this forms a locating medium by which, after the table has been released and run back to allow a hole to be gauged, it may again be set forward exactly to its former position, so that when it is again clamped to the reciprocating block the wheel will cut to precisely the same depth as before table and block were disconnected. An automatic cross feed and stop are furnished with this machine.

The head stock is of the lathe type, with hollow spindle, hardened and ground; cone bearings $2\frac{1}{4}$ " in diameter, hardened and ground, the thread on the nose of the spindle is accurately ground so that jaw chucks and face plates can be put on and removed without injury to its accuracy. The spindle also takes the No. 5 split and step chucks, for use on smaller work.

Swing over table, 8". Distance between centers, 15". Length of stroke of table, 6". Speed of countershaft, 500 revolutions per minute. Floor space, 30" x 48".

GRINDER HEADS, COLUMNS AND COUNTERSHAFTS.

DESCRIPTION FIGS. 11972 TO 11974.

This machine takes wheels for 8" diameter, 1" face, and $\frac{1}{2}$ " hole.

It is particularly adapted for light grinding and polishing and can be easily attached to bench or other support. A column is furnished when desired.

DIMENSIONS OF HEAD.

Distance between wheels 7". Length over all $11\frac{1}{2}$ ".
Height from base to center of spindle $5\frac{1}{4}$ ".
Spindle pulley 2" diameter, $1\frac{1}{4}$ " face.

COLUMN.

The column is $36\frac{1}{2}$ " high, base $13" \times 16"$, table $12" \times 15"$, and is provided with a shelf and water pot under the table.

An 8" countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 15 lbs.
Weight of column ready for shipment, about 100 lbs.

Total weight head, column and countershaft ready for shipment, about 160 lbs.

8" GRINDER HEAD.



FIG. 11972.

8" GRINDER HEAD WITH RESTS.



FIG. 11973.

8" GRINDER HEAD WITH JEWELERS' SPINDLE.



FIG. 11974.

DESCRIPTION FIG. 11975.

10" GRINDER HEAD.

For Wheels $10" \times 1\frac{1}{2}" \times \frac{3}{4}"$.

This machine will be found well adapted for all classes of light grinding for which a machine of this kind is required.

DIMENSIONS OF HEAD.

Distance between wheels $11\frac{1}{2}"$. Length over all $16\frac{1}{2}"$.
Height from base to center of spindle $6\frac{1}{2}"$.
Spindle pulley $2\frac{3}{4}"$ diameter, $2\frac{1}{4}"$ face.

COLUMN.

The column is 34" high, base $14" \times 18"$, table $14" \times 18"$, and is provided with a shelf and water pot under the table.

A 10" countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 45 lbs.

Weight of column ready for shipment, about 115 lbs.

Total weight, head, column and countershaft ready for shipment, about 215 lbs.

12" GRINDER HEAD.

For Wheels $12" \times 2" \times 1"$.

DIMENSIONS OF HEAD.

Distance between wheels $15\frac{1}{2}"$. Length over all $22\frac{1}{2}"$.
Height from base to center of spindle $7\frac{1}{4}"$.
Spindle pulley $3\frac{1}{2}"$ diameter, $2\frac{1}{4}"$ face.

COLUMN.

The column is $31\frac{1}{2}"$ high, base $16" \times 21"$, table $16" \times 21"$, and is provided with a shelf and water pot under the table.

A 12" countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 75 lbs.

Weight of column ready for shipment, about 175 lbs.

Total weight, head, column and countershaft ready for shipment, about 335 lbs.

10" AND 12" GRINDER HEADS.



FIG. 11975.

GRINDERS.

14" GRINDER HEAD ON COLUMN.

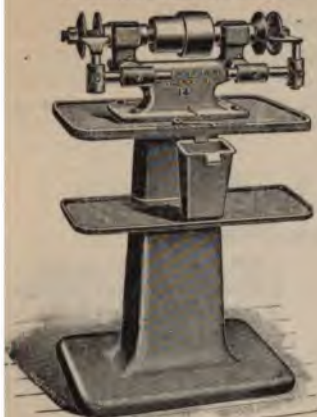


FIG. 11976.

DESCRIPTION FIG. 11976.

Suitable for wheels, $14" \times 2\frac{1}{2}" \times 1\frac{1}{4}"$

is particularly well adapted for general shop use, tool grinding, etc., as by its size and capacity the machine will be majority of shop work for which this class of grinder is used.

DIMENSIONS OF HEAD.

Distance between wheels 19". Length over all 28". Height from base to center of spindle 9". Cone pulley has two steps, $4\frac{1}{4}"$ and $5\frac{1}{4}"$ diameter, with $3\frac{1}{4}"$ face.

COLUMN.

The column is $26\frac{1}{2}"$ high, base $18" \times 24"$, table $18" \times 26\frac{1}{2}"$, provided with a shelf and water pot under the table. A $1\frac{1}{2}"$ countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 125 lbs. Weight of column ready for shipment, about 235 lbs. Total weight, head, column and countershaft ready for shipment, about 510 lbs.

16" AND 18" FOUR-WHEEL GRINDER HEADS.



FIG. 11978.

16" AND 18" GRINDER HEADS ON COLUMN.



FIG. 11977.

DESCRIPTION FIG. 11977

16" GRINDER HEAD.

For wheels, $16" \times 3" \times 1\frac{1}{2}"$

DIMENSIONS OF HEAD.

Distance between wheels 23". Length over all $33\frac{1}{2}"$. Height from base to center of spindle $10\frac{1}{4}"$. Cone pulley has two steps, 5" and 6" diameter, with $3\frac{1}{4}"$ face.

COLUMN.

The column is $25\frac{1}{4}"$ high, base $20" \times 27"$, and table $20" \times 32"$. A $1\frac{1}{2}"$ countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 190 lbs. Weight of column ready for shipment, about 260 lbs. Total weight, head, column and countershaft ready for shipment, about 625 lbs.

18" GRINDER HEAD.

For wheels, $18" \times 3\frac{1}{2}" \times 1\frac{3}{4}"$

DIMENSIONS OF HEAD.

Distance between wheels 27". Length over all 39". Height from base to center of spindle $11\frac{1}{4}"$. Cone pulley has two steps, $5\frac{1}{4}"$ and $6\frac{3}{4}"$ diameter, with $4\frac{1}{4}"$ face.

COLUMN.

The column is 23" high, base $22" \times 30"$, and table $22" \times 37\frac{1}{2}"$. An $1\frac{1}{2}"$ countershaft is furnished with this machine when desired.

Weight of head ready for shipment, about 290 lbs. Weight of column ready for shipment, about 300 lbs. Total weight, head, column and countershaft ready for shipment, about 800 lbs.

DESCRIPTION FIG. 11978.

These heads are made in two sizes, 16" and 12". In many shops and factories it is often necessary to have different shapes and grades of emery wheels on one machine, for use in sharpening saws, wood-working tools, etc.

The four-wheel grinder head meets these conditions. In general design it is similar to the regular grinder head, with the exception that it is made to allow the use of four wheels instead of two.

Much time is often saved by the use of a machine of this type, as the operator need not change wheels whenever a different

GRINDERS.

WATER ATTACHMENTS.

DESCRIPTION FIG. 11975.

The water attachments are arranged for use on the 12" and 14" grinder heads shown in Figs. 11975 and 11976. They are so constructed that the outside covering plates can be easily removed and access quickly had to the wheels. Tool rests and plates for deflecting water are adjustable to the wear of the wheel.



FIG. 11979.

DESCRIPTION FIG. 11980.

Suitable for use on 16" and 18" grinders shown in Fig. 11977.

It is often necessary to grind a flat surface, and with the ordinary grinder is this impossible, as there is nothing to regulate the amount to be ground off.

We make and furnish a surface grinding attachment for use in grinding flat surfaces comparatively true.

This attachment is clamped firmly to the frame of the grinder head, may be turned back so as not to interfere with the use of the machine as an ordinary grinder, or easily removed. An attachment of this kind will be found of great advantage in foundries and machine shops where rough fitting is required, finishing iron patterns, etc.

SURFACE GRINDING ATTACHMENTS.



FIG. 11980.

NO. 0 BENCH GRINDER.

SPECIFICATIONS FIG. 11981.

Bench room occupied.....	8" x 12"
Height to center of arbor.....	31 1/4"
Length of bearing.....	2"
Diameter of arbor through bearing.....	1"
Diameter of arbor between flanges.....	3 1/4"
Diameter of flanges.....	3"
Size of pulley on arbor.....	4" x 2 1/2"
Weight of machine alone.....	40 lbs.
Weight of machine alone, crated for shipment, about.....	50 lbs.
Weight of machine and countershaft, crated for shipment, about.....	116 lbs.



FIG. 11981.

SPECIFICATIONS OF COUNTERSHAFT.

Driving pulley.....	14" x 2 1/4"
Tight and loose pulleys.....	3" x 2 1/4"
Diameter of shaft.....	1"
Length of shaft.....	19"
Drop of hangers.....	9"
Speed, revolutions.....	430

GRINDERS.

DESCRIPTION FIGS. 11982 TO 11984.

This machine is built in three sizes, No. 1, No. 2 and No. 2½. It can be furnished as a bench grinder, Fig. 11982, or mounted on floor stand, Fig. 11984. Countershaft, Fig. 11983, is supplied only when ordered.

Machine has crucible steel arbor provided with dustproof bearings having best quality lubricating devices.

BENCH MACHINE.



FIG. 11982.

SPECIFICATIONS.

	No. 1.	No. 2	No. 2½.
Carries wheels up to.....	10" x 2"	12" x 2"	14" x 2"
Bench room occupied.....	7½" x 7½"	9" x 9"	11" x 11"
Distance between wheels.....	10½"	13½"	15½"
Height to center of arbor.....	6½"	8"	10"
Length of bearings.....	3"	4½"	5"
Diameter of arbor through bearings.....	1"	1½"	1¾"
Diameter of arbor between flanges.....	¾"	1"	1¾"
Diameter of flanges.....	2¾"	3"	3¾"
Size of pulley on arbor.....	2¾" x 2¾"	3¾" x 3"	4¾" x 3¾"
Weight of machine alone.....	30 lbs.	55 lbs.	95 lbs.
Weight of countershaft.....	50 lbs.	60 lbs.	60 lbs.
Weight of machine alone, crated for shipment, about.....	35 lbs.	75 lbs.	110 lbs.
Weight of machine and countershaft, crated for shipment, about.....	90 lbs.	155 lbs.	190 lbs.
Weight of column, alone.....	180 lbs.	180 lbs.	155 lbs.

COUNTERSHAFT.



FIG. 11983.

MACHINE ON FLOOR STAND.



SPECIFICATIONS OF COUNTERSHAFTS.

	No. 1.	No. 2.	No. 2½.
Driving pulley.....	14" x 2¾"	14" x 3¾"	14" x 3¾"
Tight and loose pulleys.....	5" x 2¾"	5" x 3¾"	5" x 3¾"
Diameter of shaft.....	1"	1"	1"
Length of shaft.....	19"	20"	20"
Drop of langers.....	9"	9"	9"
Speed, revolutions.....	350	370	425

GRINDERS.

**NO. 3 GRINDING MACHINE,
WITH SELF-OILING BEARINGS.**



FIG. 11985.

	No. 4	No. 5	No. 6
Carries wheels.....	14" x 2"	16" x 2½"	18" x 3"
Distance between wheels...	17½"	20"	24"
Length of bearings.....	4½"	5¼"	6"
Diameter of spindle in bearings.....	1¼"	1½"	1½"
Diameter of spindle between flanges.....	1½"	1¾"	1½"
Size of spindle cone pulley..	3" and 4" x 3¼" 4" and 5" x 3¼" 5" and 6" x 4¼"		
Height from table to center of spindle.....	8"	9"	10½"
Height from floor to center of spindle.....	37"	36"	36"
Weight, complete, about...	310 lbs.	365 lbs.	475 lbs.
Speed of countershaft.....	485	500	500

TYPE 1 GRINDER HEAD.



FIG. 11987.

DESCRIPTION FIG. 11985.

This machine is built in three sizes and can be furnished as a bench machine or mounted on iron column as shown. Countershaft is furnished only when ordered.

	No. 1.	No. 2.	No. 3.
Carries wheels.....	8" x 1"	10" x 1½"	12" x 2"
Distance between wheels.....	8"	10¼"	13"
Length of bearings.....	2¼"	3"	4½"
Diameter of spindle in bearings.....	¾"	¾"	1¼"
Diameter of spindle between flanges.....	½"	¾"	1"
Size of spindle pulley.....	2¼" x 2"	3" x 2¼"	3½" x 3¼"
Height from table to center of spindle.....	5¼"	6"	6½"
Height from floor to center of spindle.....	38½"	38½"	38½"
Weight, complete, about.....	170 lbs.	200 lbs.	270 lbs.
Speed of countershaft.....	740	575	435

**NO. 6 GRINDING MACHINE,
WITH SELF-OILING BEARINGS.**



FIG. 11986.

DESCRIPTION FIG. 11987.

This grinder is made in four sizes, as follows:

Sizes heads, columns and countershafts...	12"	14"	16"	18"
Size wheels (not over)...	12" x 1" 14" x 1½" 16" x 2" 18" x 2¼"			
Size hole in wheels...	¾"	1"	1¼"	1½"

For description of columns and countershafts for this machine, see Figs. 11993 to 11996.

GRINDERS.

DESCRIPTION FIGS. 11908 TO 11992.

These grinder heads are built in the same sizes as those shown in Fig. 11987 on preceding page, these cuts being shown to illustrate various styles of attachments which can be furnished.

Columns and countershafts for use with these heads are described in Figs. 11993 to 11996.

TYPE 8 GRINDER HEAD.
(Surfacing Attachment.)



FIG. 11908.

TYPE 9 GRINDER HEAD.
(Edge-Grinding Attachment.)



FIG. 11989.

TYPE 10 GRINDER HEAD.
(Wet-Grinding Attachment.)



FIG. 11990.

TYPE 12 GRINDER HEAD.
(Double Wet-Grinding Attachment.)



FIG. 11991.

TYPE 14 GRINDER HEAD.
(Combination Attachment.)



FIG. 11992.

GRINDERS.

COLUMNS FOR GRINDER HEADS.



Column—Type 6.

FIG. 11993.

Column—Type 7.

FIG. 11994.

Column—Type 133.

FIG. 11995.

DESCRIPTION FIGS. 11993 TO 11995.

The grinder heads shown in Figs. 11987 to 11992 inclusive can be fitted with any of the columns here shown.

Type 6 represents the ordinary plain iron column.

Type 7 is an iron column with self-contained countershaft. When this is used, no overhead countershaft is required.

Type 133 is an iron column fitted with electric motor to drive the grinder. In ordering this it is always necessary to advise the nature of current on which the motor will be operated.

COUNTERSHAFT FOR GRINDER.

DESCRIPTION FIG. 11996.

This countershaft is made in four sizes and is designed for use with grinders shown in Figs. 11987 to 11992 inclusive.

SPECIFICATIONS.

	12"	14"	16"	18"
Driving pulley.....	9" x 2 1/4"	12" x 3 1/4"	12" x 3 1/2"	12" x 4 1/2"
Tight and loose pulleys..	5" x 2 1/2"	5" x 3 1/4"	5" x 3 3/4"	5" x 4 1/4"
Speed, revolutions per minute.....	500	400	500	600
Weight.....	50 lbs.	65 lbs.	75 lbs.	125 lbs.



FIG. 11995.

NO. 2 1/2 L FLOOR GRINDER.

DESCRIPTION FIG. 11997.

Carries two wheels, 16" in diameter, 2 1/2" thick.

SPECIFICATIONS.

Floor space occupied.....	17" x 24"
Distance between wheels.....	20"
Height to center of arbor.....	36"
Length of bearings.....	6 1/4"
Diameter of arbor through bearings.....	1 1/2"
Diameter of arbor between flanges.....	1 1/2"
Diameter of flanges.....	5"
Size of cone pulley on arbor.....	3 1/2" and 4 1/2" x 3 1/4"
Weight of machine alone.....	300 lbs.
Weight of machine, crated for shipment, about.....	400 lbs.
Weight of machine and countershaft, crated for shipment, about.....	550 lbs.

COUNTERSHAFT.

Cone pulley.....	13" and 14" x 2 1/4"
Tight and loose pulleys.....	7" x 3 1/4"
Diameter of shaft.....	1 3/4"
Drop of hangers.....	10"
Speed, revolutions.....	415
Weight.....	150 lbs.

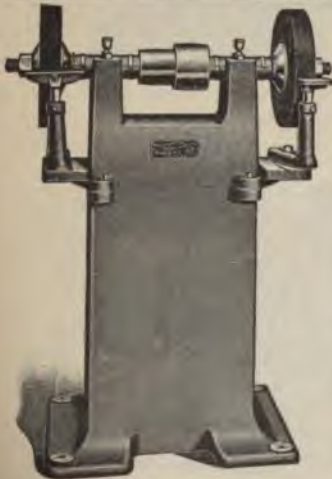


FIG. 11997.

THE PATENT OFFICE OF THE UNITED STATES DEPARTMENT OF COMMERCE

GRINDERS.

DESCRIPTION FIG. 11998.

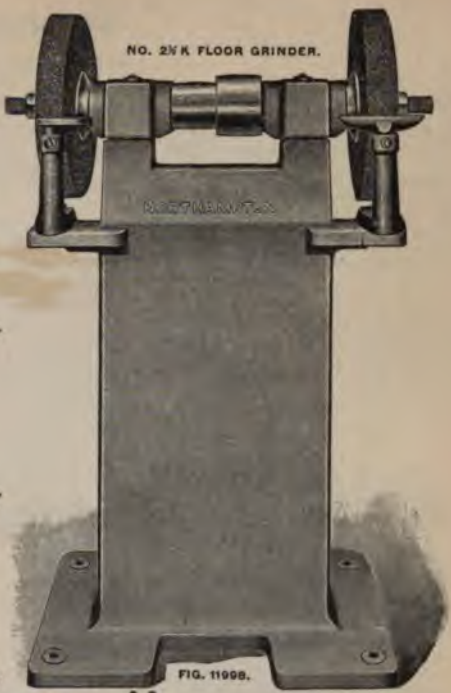
Carries two wheels, 16" in diameter, 3" thick.

SPECIFICATIONS.

Floor space occupied.....	17" x 24"
Distance between wheels.....	20"
Height to center of arbor.....	36"
Length of bearings.....	6 1/4"
Diameter of arbor through bearings.....	1 3/8"
Diameter of arbor between flanges.....	1 1/4"
Diameter of flanges.....	5"
Size of cone pulley on arbor.....	3 1/2" and 4 1/2" x 3 1/4"
Weight of machine alone.....	325 lbs.
Weight of machine alone, crated for shipment, about.....	425 lbs.
Weight of machine and countershaft, crated for shipment, about.....	600 lbs.

COUNTERSHAFT.

Cone pulley.....	13" and 14" x 3 1/4"
Tight and loose pulleys.....	7" x 3 1/4"
Diameter of shaft.....	1 1/2"
Length of shaft.....	32"
Drop of hangers.....	10"
Weight.....	120 lbs.
Speed, revolutions.....	415



NO. 2N K FLOOR GRINDER.

FIG. 11998.

HEAVY FLOOR GRINDER.



FIG. 11999.

DESCRIPTION FIG. 11999.

This machine is built in two sizes, as per specifications on following page. It is a very heavily built grinder, having a crucible steel spindle, running in self-oiling, dust-proof bearings.

The No. 3H machine will carry two wheels 20" diameter by 4" thick.

The No. 3I machine will carry two wheels 24" diameter by 4" thick.

GRINDERS.

SPECIFICATIONS FIG. 11999.

	No. 3 H.	No. 3 L.
Floor space occupied.....	22" x 33"	24" x 37"
Distance between wheels.....	29"	36"
Height to center of arbor.....	36"	34"
Length of bearings.....	8"	10"
Diameter of arbor through bearings.....	1½"	2½"
Diameter of arbor between flanges.....	1½"	2"
Diameter of flanges.....	6"	8"
Size of cone pulley on arbor.....	4½" and 6" x 4"	6½" and 8" x 5¼"
Weight of machine alone.....	575 lbs.	960 lbs.
Weight of machine, crated for shipment, about.....	710 lbs.	1,100 lbs.
Weight of machine and countershaft, crated for shipment, about.....	975 lbs.	1,350 lbs.

COUNTERSHAFT.

Cone pulley.....	12" and 14" x 4½"	12" and 14" x 5¼"
Tight and loose pulleys.....	8" x 4¼"	10" x 5¼"
Diameter of shaft.....	1½"	1½"
Length of shaft.....	38"	51"
Drop of hangers.....	10"	10"
Weight.....	150 lbs.	200 lbs.
Speed, revolutions.....	450	560

NO. 7 GRINDING MACHINE.



FIG. 12000.

DESCRIPTION FIG. 12001.

This machine takes wheels to 36" diameter, 5" face, and 2½" hole. Diameter of spindle in bearings, 2½". Diameter of spindle between flanges, 2½". (Or if desired, 2¼" or 2".) Distance between wheels, 40". Total length of spindle, 56". Height to center of spindle, 32". Cone pulley, 8" and 9" diameter, 5¼" face. Base, 40½" x 28". The countershaft has driving pulleys 17" and 18" diameter, 5¼" face; and tight and loose pulleys 10" diameter, 5¼" face; hangers 12" drop. Weight, ready for shipment, about 1,400 lbs.

DESCRIPTION FIG. 12000.

For wheels 24" x 4" x 2".

Distance between wheels.....	35"
Length of bearings.....	10"
Diameter of spindle in bearings.....	2½"
Diameter of spindle between flanges.....	2"
Size of spindle cone pulley.....	7½" and 8½" x 4½"
Height from floor to center of spindle.....	32"
Weight of machine without countershaft, about.....	800 lbs.
Speed of countershaft.....	425

HEAVY FLOOR GRINDER.



FIG. 12001.

CRINDERS.

NO. 4 HEAVY FLOOR GRINDER.



FIG. 12002.

DESCRIPTION FIG. 12002.

Self-oiling, dustproof bearings, crucible steel arbor. Carries two wheels, 36" in diameter, 1" thick.

SPECIFICATIONS.

Floor space occupied.....	24" x 40"
Length of arbor over all.....	64"
Distance between wheels.....	45"
Height to center of arbor.....	32"
Length of bearings.....	10"
Diameter of arbor through bearings.....	2 1/4"
Diameter of arbor between flanges.....	2"
Diameter of flanges.....	12"
Size of cone pulley on arbor.....	10" and 12" x 6 1/4"
Weight of machine.....	1,300 lbs.
Weight of machine crated for shipment, about.....	1,550 lbs.
Weight of machine and countershaft, crated for shipment, about.....	1,850 lbs.

SPECIFICATIONS OF COUNTERSHAFT.

Cone pulley.....	12" and 14" x 6 1/4"
Tight and loose pulleys.....	12" x 6 1/4"
Diameter of shaft.....	1 1/2"
Length of shaft.....	57"
Drop of hangers.....	10"
Weight.....	350 lbs.
Speed, revolutions.....	350

NOS. 1, 2 AND 3 MACHINES.



FIG. 12003.

COMBINATION GRINDING, POLISHING AND BUFFING MACHINES.

SPECIFICATIONS FIG. 12003.

	No. 1.	No. 2.	No. 3.
Carries wheels, diameter.....	5"	10"	12"
Length of spindle.....	16½"	22"	28½"
Diameter of spindle in bearings.....	¾"	¾"	1¾"
Diameter of spindle between flanges.....	½"	¾"	1"
Length of bearings.....	2¼"	3"	4¼"
Size of spindle pulley.....	2¼" x 2"	3" x 2¼"	3½" x 3¼"
Height from table to center of spindle.....	5¼"	6"	6½"
Height from floor to center of spindle.....	38½"	38½"	38½"
Weight, complete, about.....	175 lbs.	200 lbs.	270 lbs.
Speed of countershaft.....	740	575	435

SPECIFICATIONS FIG. 12004.

	No. 4.	No. 5.
Carries wheels, diameter.....	14"	16"
Length of spindle.....	34"	38"
Diameter of spindle in bearings.....	1¼"	1½"
Diameter of spindle between flanges.....	1¾"	1¾" and 3¼"
Length of bearings.....	4½"	5¼"
Size of spindle cone pulley.....	3" and 4" x 3¼" 4" and 5" x 3¼"	
Height from table to center of spindle.....	8"	9"
Height from floor to center of spindle.....	37"	36"
Weight, complete, about.....	310 lbs.	365 lbs.
Speed of countershaft.....	485	500

NO. 4 AND NO. 5 MACHINES.



FIG. 12004.

NO. 11 COMBINATION GRINDER.



FIG. 12005.

DESCRIPTION FIG. 12005.

This little machine is very handy for miscellaneous small grinding. It is a combination of an electrical bench grinder and small twist drill grinder.

The drill is held at the point by steel fingers entering the grooves and holding it firmly. The action of the holder is positive and sets itself automatically to give the drill being ground, the proper point and clearance. A drill ground on this machine will turn out two equally thick chips that will remain intact, and, in addition to saving the operators' time,

COMBINATION GRINDER.

DESCRIPTION FIG. 12005.—Continued.

will prolong the life of the drill. It is an established fact that some mechanics will not use a drill grinder, but prefer to dress the drills by hand on an ordinary wheel. For these men a 6" x 3/4" emery wheel is provided, mounted directly on the motor shaft. This can also be used as an ordinary bench grinder for all classes of light work.

If desired, the drill grinding attachment can be omitted entirely, making a plain bench grinding machine.

Machine is built in several styles, as follows:

No. 10 grinder, motor-driven, taking drills from No. 70 to 3/8".

No. 12 grinder, motor-driven, taking drills from No. 70 to 1/2".

No. 2 grinder, for belt drive, taking drills from No. 70 to 3/8".

No. 2 1/2 grinder, for belt drive, taking drills from No. 70 to 1/2".

No. 11 grinder, motor-driven, taking drills from No. 70 to 3/8", with attachment for cutter grinding as shown in cut.

No. 23 plain motor-driven bench grinder, without drill grinding attachment.

Motor-driven machines are designed to operate on a direct current of 110 or 220 volts.

A cast-iron column can be supplied, if desired.

PORTABLE ELECTRIC GRINDERS.

DESCRIPTION FIG. 12006.

We here illustrate a portable electrical bench grinder which will be found very handy for small tool grinding. Made with adjustable cone bearings.

It can be used for grinding, buffing and polishing, as the emery wheel can be removed and any other substituted. Made in three types, E, F, and M. We include one wheel and detachable tool rest with each machine.

No.	Volts.	SIZES. Dimensions.	Weight.	Horse-Power.
E-110.....	110	4 1/2" x 7 1/2"	15 lbs.	1/4
E-220.....	210			
F-110.....	110	6" x 11"	30 lbs.	1/2
F-220.....	210			
M-110.....	110	7" x 14"	65 lbs.	1
M-220.....	220			

Emery wheel, 4 1/2" x 3/8" x 1/8" with type E grinder.

Emery wheel, 8" x 3/4" x 1/8" with type F grinder.

Emery wheel, 10" x 1" x 3/8" with type M grinder.

ELECTRICAL BENCH GRINDER.



FIG. 12006.

ELECTRICAL-DRIVEN AERIAL SURFACE GRINDER,
WITH STATIONARY END HANDLES.

FIG. 12007.

DESCRIPTION FIG. 12007.

We here illustrate the grinder with stationary end handles. It can be furnished with adjustable spade body handle. Please mention style handle desired in ordering.

Type.	Volts.	Motor Dimensions.	Weight.	Horse- Power.
0-110.....	110	6" x 11"	40 lbs.	1/4
0-220.....	220			
00-110.....	110	7" x 14"	65 lbs.	1
00-220.....	220			

With 0 grinder a 8" x 3/4" x 1/8" emery wheel included.

With 00 grinder a 10" x 1" x 3/8" emery wheel included.

PORTABLE ELECTRIC GRINDERS.

ELECTRIC GRINDING ATTACHMENT.



FIG. 12008.

This combination grinder is a time saver, quick and simple in its adjustments and easy to operate. No rigging up or bothersome connections to make. You'll be surprised at its adaptability.

In ordering, always mention voltage. Current must be direct.

DESCRIPTION FIGS. 12008 TO 12010.

This grinding attachment, or tool-post grinder, as it is sometimes called, has a wide range of work, such as grinding centers, cutters, reamers, dies, rolls, etc.; also surface, parallel and internal grinding jobs of all kinds.

Shank of grinder is set in tool post of lathe, planer, shaper, milling machine, or can be clamped in a vise. Sent out complete with wheels, cord and attachment plug. Comes with any incandescent lamp socket and it is ready.

GRINDING LATHE CENTER.



FIG. 12009.

GRINDING CUTTER IN A MILLING MACHINE.



FIG. 12010.

Machines are regularly furnished as follows:

With type A grinder, 1 emery wheel, $4\frac{1}{2}'' \times \frac{1}{4}'' \times \frac{1}{2}''$. 1 extension mandrel, with wheel, $1\frac{1}{2}'' \times \frac{3}{4}'' \times \frac{1}{2}''$.

1 tooth rest, 1 wrench.

With type B grinder, 1 emery wheel $8'' \times \frac{1}{2}'' \times \frac{1}{2}''$; 1 extension mandrel, with wheel, $2'' \times \frac{1}{2}'' \times \frac{1}{2}''$.

With type D grinder, 1 emery wheel, $10'' \times 1'' \times \frac{1}{2}''$; larger or smaller than the above sized wheels can be used.

Care should be taken that the wheel is kept true. In ordering, always mention type and voltage.

All machines sent complete, ready for work.

SPECIFICATIONS.

Type of Grinders.	Volts.	Dimensions.	Weight.	Horse Power.
A-110.....	110 $\frac{1}{2}$	$4\frac{1}{4}'' \times 7\frac{1}{2}''$	16 lbs.	$\frac{1}{4}$
A-220.....	220 $\frac{1}{2}$			
B-110.....	110 $\frac{1}{2}$	$6'' \times 10''$	35 lbs.	$\frac{3}{8}$
B-220.....	220 $\frac{1}{2}$			
D-110.....	110 $\frac{1}{2}$	$7'' \times 14''$	78 lbs.	1
D-220.....	220 $\frac{1}{2}$			

PORTABLE ELECTRIC GRINDERS.

MOTOR-DRIVEN FLEXIBLE SHAFT GRINDING OUTFIT.



FIG. 12011.

DESCRIPTION FIG. 12011.

We are selling these exclusive emery grinders to some of the largest manufacturers in the country, and they are giving the best of satisfaction. There has also developed without any effort on our part a considerable demand for them among street railroad companies for grinding off rails for bonding. Some time ago we shipped one of these plants to a large contractor in Philadelphia, which was followed by orders for several others. Since that time we have received inquiries and orders from all over the country from people who had seen these plants in use in that city.

Advise us as to the work you wish to do, the size of emery wheels you wish to use and the voltage of your current, and we will take pleasure in quoting you on such a plant as we think would best meet your requirements.

FLEXIBLE SHAFT GRINDING PLANTS.

DESCRIPTION FIG. 12012.

For no tool we sell has there been so rapidly increasing a demand as for our portable emery grinder. It is giving perfect satisfaction to hundreds of our customers.

For cleaning and grinding heavy castings, for buffing and polishing all metals and glass, it is almost indispensable. For ordinary shop work, we usually sell either our No. 3, 4, 5, or 6 plant as described below.

No. 3 plant, for emery wheel $4'' \times \frac{3}{4}''$, consists of 1 No. 3 flexible shaft; 1 No. 3 stop clutch; 1 No. 3 clamp spindle; 1 No. 3 countershaft.

Tight and loose pulleys $5''$ diameter for $2\frac{1}{2}''$ belt should run about 1,300 revolutions per minute.

No. 4 plant, for emery wheel $6'' \times 1''$, consists of 1 No. 4 flexible shaft; 1 No. 4 stop clutch; 1 No. 4 clamp spindle; 1 No. 3 countershaft.

Tight and loose pulleys $5''$ diameter for $2\frac{1}{2}''$ belt should run about 1,200 revolutions per minute.

No. 5 plant, for emery wheel $8'' \times 1''$, consists of 1 No. 5 flexible shaft; 1 No. 5 stop clutch; 1 No. 5 clamp spindle; 1 No. 5 countershaft.

Tight and loose pulleys $6''$ diameter for $3''$ belt should run about 1,100 revolutions per minute.

No. 6 plant, for emery wheel $10'' \times 1''$, consists of 1 No. 6 flexible shaft; 1 No. 6 stop clutch; 1 No. 6 clamp spindle; 1 No. 6 countershaft.

Tight and loose pulleys $10''$ diameter for $4''$ belt should run about 1,100 revolutions per minute.

Note: Rawhide driving rope and couplings are not included, but will be quoted extra, depending on length of rope and number of couplings required.



FIG. 12012.

DISK GRINDERS.

NO. 1 B GRINDER.



FIG. 12013.

DESCRIPTION FIG. 12014.

Machine is furnished as shown complete with countershaft, floor setting up press and all accessories, with two extra 12" spiral grooved steel disks, making four disks in all, including cement, oil, glue pot and brush, wrenches etc., and a complete assortment of emery paper and cloth circles, also complete assortment of spiral emery paper and cloth circles.

Floor space, 26" x 29".
 Diameter of disks, 12".
 Speed of disks, 2,500 revolutions per minute.
 Spindle pulley, 3 1/4" diameter by 3" face.
 Length of spindle over all, 18 1/4".
 Diameter of spindle, 1 1/4".
 Length of spindle bearings, 6 1/4".
 Height to center of spindle, 42".
 Base of press, 17" x 17".
 Operating floor space for this press should be 4' x 4'.

COUNTERSHAFT.

Ceiling space, 16" x 30".
 Speed, 670 revolutions per minute.
 Tight and loose pulleys, 6" diameter by 3 1/4" face.
 Driving pulley, 14" diameter by 3" face.
 Weight of machine complete with countershaft, net, 1,050 lbs.
 Crated for domestic shipment, 1,150 lbs.
 Boxed for ocean shipment, 1,420 lbs.
 Measurement, 55 cubic feet.

DESCRIPTION FIG. 12013.

Machine is furnished as shown with two 12" spiral grooved steel disks, complete with countershaft, floor setting up press and all accessories, including cement, oil, glue pot, and brush, wrenches, etc., and a complete assortment of spiral paper and cloth circles.

Floor space, 26" x 22".
 Diameter of disks, 12".
 Speed of disks, 2,500 revolutions per minute.
 Spindle pulley, 3 1/4" diameter by 3" face.
 Length of spindle over all, 18 1/4".
 Diameter of spindle, 1 1/4".
 Length of spindle bearings, 6 1/4".
 Height to center of spindle, 42".
 Press for setting up circles, 14 1/2" diameter. Press requires 3' of bench room.

COUNTERSHAFT.

Ceiling space, 16" x 30".
 Speed, 670 revolutions per minute.
 Tight and loose pulleys, 6" diameter by 3 1/4" face.
 Driving pulley, 14" diameter by 3" face.
 Weight of machine complete with countershaft, net, 790 lbs.
 Crated for domestic shipment, 800 lbs.
 Boxed for ocean shipment, 950 lbs.
 Measurement, 30 cubic feet.

NO. 3 GRINDER.



FIG. 12014.

DISK GRINDERS.

DESCRIPTION FIG. 12015.

This grinder is heavy and accurate. With suitable coarse abrasive it will do heavy roughing on castings and forgings, its speed making it a rapid cutter. It can also be used as a precision machine for finishing fine tools. Tables, slides and bearings are all carefully scraped. Each machine is furnished with two 18" steel disks, an assortment of emery paper circles and complete countershaft.

SPECIFICATIONS.

Speed of spindle, revolutions per minute.....	1,800
Pulley on spindle.....	4½" x 4¼"
Driving pulley on countershaft.....	24" x 5"
Tight and loose pulleys on countershaft.....	12" x 6"
Approximate net weight.....	1,300 lbs.

NO. 181 GRINDER.



FIG. 12015.

NO. 4 GRINDER.



DESCRIPTION FIG. 12016.

Machine is furnished complete as shown with countershaft, floor setting-up press and all accessories, including two extra spiral grooved steel disks, making four disks in all, including cement, oil, glue pot and brush, wrenches, etc., and a complete assortment of our celebrated spiral paper and circles, also complete assortment of our celebrated spiral emery paper and cloth circles.

Floor space, 32" x 34".
 Diameter of disks, 18".
 Speed of disks, 1,800 revolutions per minute.
 Spindle pulley, 4½" diameter by 3¼" face.
 Length of spindle over all, 22¼".
 Diameter of spindle, 1½".
 Length of spindle bearings, 7½".
 Height to center of spindle, 42".
 Base of press, 20" x 20".
 Operating floor space for this press should be 5' x 5'.

COUNTERSHAFT.

Ceiling space, 30" x 22".
 Speed, 480 revolutions per minute.
 Tight and loose pulleys, 8" diameter by 4¼" face
 Drive pulley, 16" diameter by 3¼" face.
 Weight of machine complete with countershaft, net,
 1,700 lbs.
 Crated for domestic shipment, 1,990 lbs.
 Boxed for ocean shipment, 2,520 lbs.
 Measurement, 75 cubic feet.

DISK GRINDERS.

NO. 128 GRINDER



FIG. 12077.

DESCRIPTION FIG. 12077.

Machine is furnished complete as shown, with four setting-up press and all accessories, including cement, oil, glue pot and brush, wrenches, etc., and a complete assortment of spiral paper and cloth circles.

*Floor space, 20" x 27".
Diameter of disks, 18".
Speed of disks, 1,800 revolutions per minute.
Spindle pulley, 4" diameter by 2" long.
Length of spindle over all, 22 1/2".
Diameter of spindle, 1 1/2".
Length of spindle bearings, 7 1/2".
Height to center of spindle, 46".
Base of press, 17" diameter.
Operating floor space for this press should be 27" x 27".*

COUNTERSHAFT

*Collar space, 20" x 27".
Speed, 475 revolutions per minute.
Tight and loose pulleys, 8" diameter by 4 1/2" long.
Driving pulley, 16" diameter by 2 1/2" long.
Weight of machine complete with accessories, net, 1,150 lbs.
Crated for domestic shipment, 1,225 lbs.
Packed for ocean shipment, 1,300 lbs.
Cubic measurement, 50 cubic feet.*

DESCRIPTION FIG. 12078.

Machine is furnished complete as shown, with four setting-up press and all accessories, including two extra 18" spiral grooved disks, making four disks in all, including cement, oil, glue pot and brush, wrenches, etc., and a complete assortment of emery paper and cloth circles, also complete assortment of spiral paper and cloth circles.

We are prepared to furnish No. 40 grinder to be direct-connected, using any well-known make of motor.

In making inquiry for price, advise the nature of current on which motor is to operate. Also give us some information relative to kind of work the machine is to perform, so that we may figure on a motor of proper size to accomplish it in the most satisfactory manner.

NO. 40 MOTOR-DRIVEN GRINDER



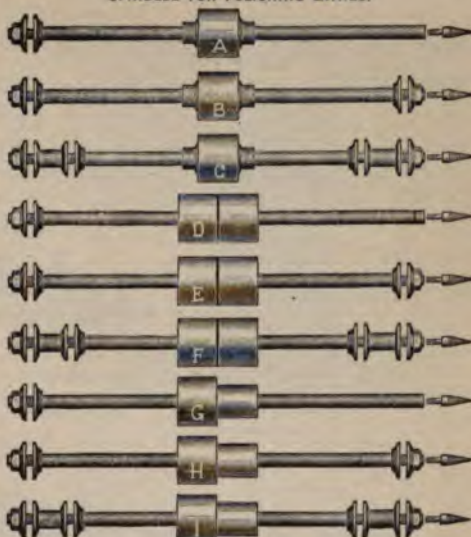
POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIG. 12019.

The spindles used in our polishing and buffing lathes (shown on this and the following pages) are made of the best machinery steel, turned and ground to size. The ends are provided with threads of 29° angle of the same depth as, but stronger, than the square thread generally used. The flanges are heavy and of large diameter. The tight flange is forced on the spindle. The flanges are similar in design to grinder flanges except that they are smaller and heavier. The spindles are furnished with single, tight and loose, or cone pulleys, as desired. In ordering, unless otherwise specified, lathes with "B" spindles will be furnished.

A small taper point, as shown in cut, is furnished with these spindles with the exception of the Nos. 0 and 1 spindles. We also furnish a small arbor with flanges and nut for carrying a small wheel when desired. It can be used in place of the taper point.

SPINDLES FOR POLISHING LATHES.



NO. 0 POLISHING LATHE.



FIG. 12020.

NO. 1 POLISHING LATHE.



FIG. 12021.

DESCRIPTION FIGS. 12020 AND 12021.

These polishing or buffing lathes have cast-iron boxes 2" long, with caps milled to fit frame and steel set screws for taking up the wear. Each is furnished with any one of four styles of spindle ("A," "B," "D," and "E"), shown above, with the exception of the taper point, which is not furnished with "B" and "E" spindles. Column and countershaft can be furnished, if desired.

	No. 0.	No. 1.
Size of base.....	7" x 5"	7" x 5"
Height from base to center of spindle.....	5 1/2"	7 1/2"
Diameter of spindle in bearings.....	1 1/2"	1 1/2"
Diameter of spindle between flanges.....	1 1/2"	1 1/2"
Length of spindle.....	14"	12"
Size of pulley on spindle.....	2" x 1 1/2"	2" x 1 1/2"
Weight of head.....	13 lbs.	15 lbs.
Weight of column.....	120 lbs.	120 lbs.
Weight of countershaft.....	25 lbs.	25 lbs.

DESCRIPTION FIG. 12022.

This size lathe is designed to do the same class of work as the Nos. 0 and 1, but is heavier and capable of more general use. It has cast-iron bearings 3 1/2" long, steel spindle and nickel-plated oil cups. It is furnished with any one of six styles of spindle ("A," "B," "C," "D," "E," and "F"), shown above. Removable taper point for right-hand end is furnished with this lathe. Column and countershaft can be furnished if desired.

Size of base.....	10" x 5"
Height from base to center of spindle.....	10"
.....	1"
.....	3 1/2"
.....	30"
.....	3" x 3"
.....	40 lbs.
.....	70 lbs.
.....	170 lbs.

NO. 1M POLISHING LATHE.



FIG. 12022.

POLISHING AND BUFFING MACHINERY.

NO. 2 POLISHING LATHE.



FIG. 12023.

DESCRIPTION FIG. 12024.
This lathe, owing to its construction with the over-hanging arm, is especially adapted for use on bicycle parts and on large pieces which must be polished under the wheel. The projection of the wheel from the column allows many kinds of work to be polished that would be difficult to polish on the ordinary lathes. It is furnished with removable cast-iron boxes, steel spindles and nickel-plated oil cups. It is furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

DIMENSIONS OF HEAD.

Size of base.....	16 1/2" x 10"
Height from base to center of spindle.....	11 1/2"
Diameter of spindle in bearings.....	1 1/2"
Diameter of spindle between flanges.....	1 1/4"
Length of spindle.....	52"
Size of single pulley.....	5 1/2" x 7 1/2"
Size of tight and loose pulleys.....	6" x 4 1/4"
Size of cone pulley.....	5" and 9" x 4 1/4"

COLUMN.

The column for this lathe is furnished without table, as shown in cut, and is of the following dimensions: Height, 20 1/2"; size of base, 24" x 20".

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys 9" x 4 1/4", single driving pulley, 18" x 4 1/4". When furnished with cone pulley 17" and 18" x 4 1/4".

WEIGHTS.

Head, column and countershaft.....	485 lbs.
Head only.....	175 lbs.
Column only.....	160 lbs.
Countershaft only.....	150 lbs.

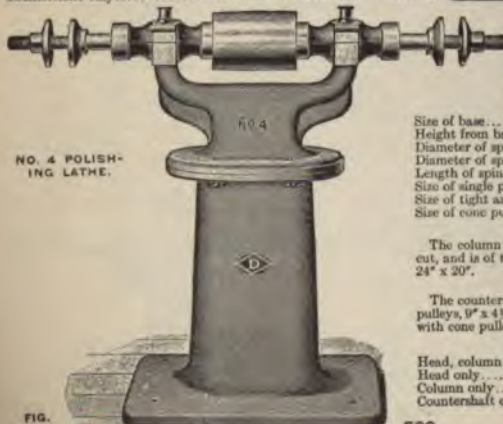


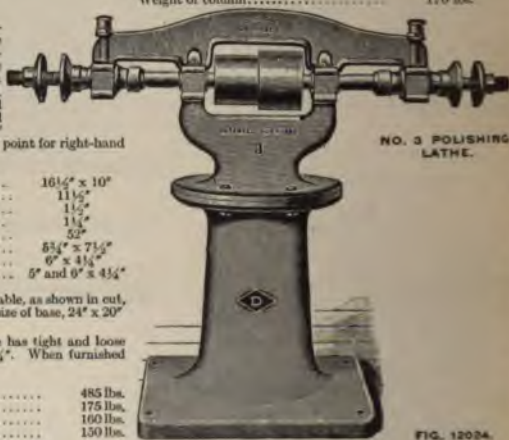
FIG. 12025.

NO. 4 POLISHING LATHE.

DESCRIPTION FIG. 12023.

This size lathe is designed for all kinds of general polishing and buffing. The bearings are furnished either cast-iron or lapped, as desired. Unless specified, cast-iron bearings will be furnished. The spindle is made of steel, turned and ground to size. This lathe is furnished with any one of the nine styles of spindles shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe. Column and countershaft can be furnished if desired.

Size of base.....	12" x 8 1/4"
Height from base to center of spindle.....	12"
Diameter of spindle in bearings.....	1 1/2"
Diameter of spindle between flanges.....	1"
Length of spindle.....	36"
Size of single pulley.....	4 1/2" x 4 1/4"
Size of tight and loose pulleys.....	4 1/2" x 3 1/4"
Size of cone pulley.....	3 1/2" and 4 1/2" x 3 1/4"
Weight of head.....	70 lbs.
Weight of countershaft.....	70 lbs.
Weight of column.....	170 lbs.



NO. 3 POLISHING LATHE.

FIG. 12024.

DESCRIPTION FIG. 12025.

This lathe is furnished with either cast-iron or lapped bearings, as desired. It is furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

DIMENSIONS.

Size of base.....	16 1/2" x 10"
Height from base to center of spindle.....	11 1/2"
Diameter of spindle in bearings.....	1 1/2"
Diameter of spindle between flanges.....	1 1/4"
Length of spindle.....	52"
Size of single pulley.....	5 1/2" x 7 1/2"
Size of tight and loose pulleys.....	6" x 4 1/4"
Size of cone pulley.....	5 1/4" and 9 1/4" x 4 1/4"

COLUMN.

The column for this lathe is furnished without table, as shown in cut, and is of the following dimensions: Height, 20 1/2"; size of base, 24" x 20".

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single driving pulley, 18" x 4 1/4". When furnished with cone pulley, 17" and 18" x 4 1/4".

WEIGHTS.

Head, column and countershaft.....	475 lbs.
Head only.....	150 lbs.
Column only.....	172 lbs.
Countershaft only.....	150 lbs.

M. H. P. H. O. O. B. M. H. Y. R. E. H. Y. H. O. E. B. H. H. H.

POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIGS. 12026 AND 12027

This lathe, having an overhanging arm, is especially adapted for polishing and buffing bicycle parts or large pieces where the work is to be done on the under side of the wheel. The construction of the overhanging arm is such that it gives the greatest strength and rigidity, and still allows ample space without interfering with column or head. The spindle is of steel, turned and ground, and runs in long babbitted bearings, in which are placed rings for supplying oil to the spindle from a reservoir in the under part of the bearing. These lathes are furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

If desired for bench work, this lathe is mounted on a bench column as shown in Fig. 12027. Height from base to center of spindle, 12".

DIMENSIONS.

Size of base	22" x 22"
Height from base to center of spindle	38"
Diameter of spindle in bearings	1 1/4"
Diameter of spindle between flanges	1 1/4"
Length of spindle	48"
Size of single pulley	5 1/2" x 7"
Size of tight and loose pulleys	6" x 4 1/4"
Size of cone pulley	3 1/4" and 6 1/4" x 4 1/4"

NO. 7 POLISHING LATHE ON BENCH COLUMN.



FIG. 12027.

DESCRIPTION FIG. 12026.

This lathe is designed for using wood or leather polishing wheels or large buffs. Its construction is such as to insure rigidity and to prevent vibration, thereby allowing wheels to be run at a very high speed. The spindle is made of steel, turned and ground, and runs in long babbitted bearings. It is furnished with single or tight and loose pulleys, as desired.

DIMENSIONS.

Height from base to center of spindle	22"
Diameter of spindle in bearings	1 1/4"
Diameter of spindle between flanges	1 1/4"
Length of spindle	38"
Size of single pulley	6" x 6"
Size of tight and loose pulleys	6" x 4 1/2"

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single pulley, 18" x 4 1/4".

WEIGHTS.

Lathe and countershaft	370 lbs.
Lathe only	200 lbs.
Countershaft only	170 lbs.

NO. 7 POLISHING LATHE.



FIG. 12026.

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single driving pulley, 18" x 4 1/4". When furnished with cone pulley, 17" and 18" x 4 1/4".

WEIGHTS.

Lathe and countershaft	520 lbs.
Lathe only	350 lbs.
Countershaft only	170 lbs.
Lathe on bench column	190 lbs.

NO. 1 DOUBLE-COLUMN POLISHING LATHE.



FIG. 12025.

POLISHING AND BUFFING MACHINERY.

NO. 2 POLISHING LATHE.



FIG. 12023.

DESCRIPTION FIG. 12024.

This lathe, owing to its construction with the overhanging arm, is especially adapted for use on bicycle parts and on large pieces which must be polished under the wheel. The projection of the wheel from the column allows many kinds of work to be polished that would be difficult to polish on the ordinary lathes. It is furnished with removable cast-iron boxes, steel spindles and nickel-plated oil cups. It is furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

DIMENSIONS OF HEAD.

Size of base.....	16½" x 10"
Height from base to center of spindle.....	11½"
Diameter of spindle in bearings.....	1½"
Diameter of spindle between flanges.....	1¾"
Length of spindle.....	32"
Size of single pulley.....	5¼" x 7½"
Size of tight and loose pulleys.....	6" x 4¾"
Size of cone pulley.....	5" and 6" x 4¾"

COLUMN.

The column for this lathe is furnished without table, as shown in cut, and is of the following dimensions: Height, 26½"; size of base, 24" x 20".

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys 9" x 4½", single driving pulley, 18" x 4¾". When furnished with cone pulley 17" and 18" x 4¾".

WEIGHTS.

Head, column and countershaft.....	485 lbs.
Head only.....	175 lbs.
Column only.....	160 lbs.
Countershaft only.....	150 lbs.

NO. 4 POLISHING LATHE.

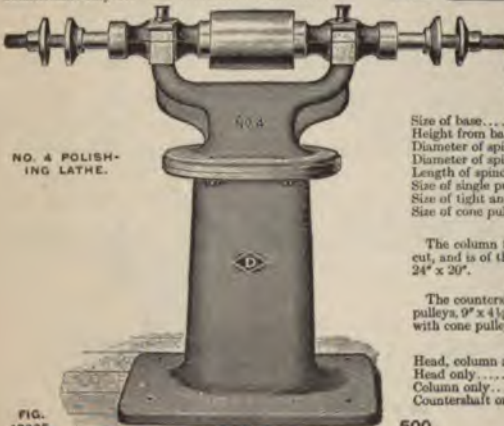
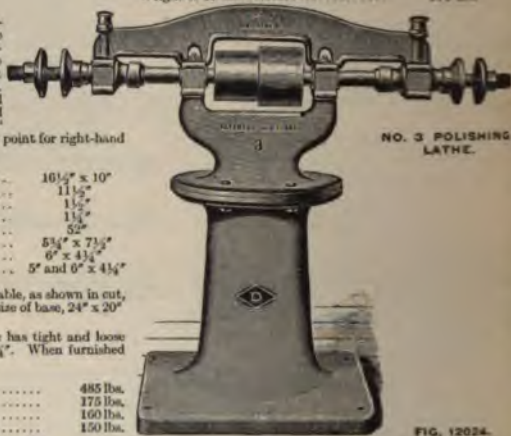


FIG. 12025.

DESCRIPTION FIG. 12025.

This size lathe is designed for all kinds of general polishing and buffing. The bearings are furnished either cast iron or babbitted, as desired. Unless specified, cast-iron bearings will be furnished. The spindle is made of steel, turned and ground to size. This lathe is furnished with any one of the one styles of spindle shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe. Column and countershaft can be furnished if desired.

Size of base.....	12" x 8½"
Height from base to center of spindle.....	12"
Diameter of spindle in bearings.....	1½"
Diameter of spindle between flanges.....	1"
Length of spindle.....	30"
Size of single pulley.....	4½" x 4½"
Size of tight and loose pulleys.....	4½" x 2½"
Size of cone pulley.....	3½" and 4½" x 3½"
Weight of head.....	70 lbs.
Weight of countershaft.....	70 lbs.
Weight of column.....	170 lbs.



NO. 3 POLISHING LATHE.

FIG. 12024.

DESCRIPTION FIG. 12025.

This lathe is furnished with either cast-iron or babbitted bearings, as desired. It is furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

DIMENSIONS.

Size of base.....	16½" x 10"
Height from base to center of spindle.....	11½"
Diameter of spindle in bearings.....	1½"
Diameter of spindle between flanges.....	1¾"
Length of spindle.....	32"
Size of single pulley.....	5¼" x 7½"
Size of tight and loose pulleys.....	6" x 4¾"
Size of cone pulley.....	5¼" and 6¼" x 6¼"

COLUMN.

The column for this lathe is furnished without table, as shown in cut, and is of the following dimensions: Height, 26½"; size of base, 24" x 20".

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4½", single driving pulley, 18" x 4¾". When furnished with cone pulley, 17" and 18" x 4¾".

WEIGHTS.

Head, column and countershaft.....	475 lbs.
Head only.....	150 lbs.
Column only.....	175 lbs.
Countershaft only.....	150 lbs.

POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIGS. 12026 AND 12027

This lathe, having an overhanging arm, is especially adapted for polishing and buffing bicycle parts or large pieces where the work is to be done on the under side of the wheel. The construction of the overhanging arm is such that it gives the greatest strength and rigidity, and still allows ample space without interfering with column or head. The spindle is of steel, turned and ground, and runs in long babbitted bearings, in which are placed rings for supplying oil to the spindle from a reservoir in the under part of the bearing. These lathes are furnished with any one of three styles of spindle ("B," "E," and "H") shown in Fig. 12019. Removable taper point for right-hand end is furnished with this lathe.

If desired for bench work, this lathe is mounted on a bench column as shown in Fig. 12027. Height from base to center of spindle, 12".

DIMENSIONS.

Size of base	22" x 22"
Height from base to center of spindle	38"
Diameter of spindle in bearings	1 1/4"
Diameter of spindle between flanges	1 1/4"
Length of spindle	48"
Size of single pulley	5 1/2" x 7"
Size of tight and loose pulleys	6" x 4 1/4"
Size of cone pulley	5 1/4" and 6 1/4" x 4 1/4"

NO. 7 POLISHING LATHE ON BENCH COLUMN.



FIG. 12027.

DESCRIPTION FIG. 12026.

This lathe is designed for using wood or leather polishing wheels or large buffs. Its construction is such as to insure rigidity and to prevent vibration, thereby allowing wheels to be run at a very high speed. The spindle is made of steel, turned and ground, and runs in long babbitted bearings. It is furnished with single or tight and loose pulleys, as desired.

DIMENSIONS.

Height from base to center of spindle	22"
Diameter of spindle in bearings	1 1/4"
Diameter of spindle between flanges	1 1/4"
Length of spindle	38"
Size of single pulley	6" x 6"
Size of tight and loose pulleys	6" x 4 1/2"

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single pulley, 18" x 4 1/4".

WEIGHTS.

Lathe and countershaft	370 lbs.
Lathe only	200 lbs.
Countershaft only	170 lbs.

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NO. 7 POLISHING LATHE.

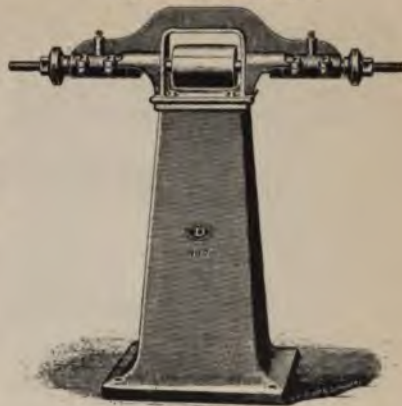


FIG. 12026.

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single driving pulley, 18" x 4 1/4". When furnished with cone pulley, 17" and 18" x 4 1/4".

WEIGHTS.

Lathe and countershaft	520 lbs.
Lathe only	350 lbs.
Countershaft only	170 lbs.
Lathe on bench column	180 lbs.

NO. 1 DOUBLE-COLUMN POLISHING LATHE.



FIG. 12028.

POLISHING AND BUFFING MACHINERY.



FIG. 12029.

DESCRIPTION FIG. 12030.

This machine has been designed to meet the demand for a very rigid projecting lathe, and its ample overhang allows the handling of large pieces.

It can be furnished mounted on column, as shown, or, if desired for bench work, without column.

The spindle is of steel, turned and ground and runs in long babbitted bearings. It can be furnished with single, tight and loose, or cone pulley.

DIMENSIONS.

Size of base.....	10' x 16½"
Height from base to center of spindle.....	15½"
Diameter of spindle in bearings.....	1¼"
Diameter of spindle between flanges.....	1"
Length of spindle.....	36"
Length of bearings.....	51½"
Projection (center of spindle beyond center of base).....	15½"
Height from base of column to center of spindle.....	38"
Size of tight and loose pulleys.....	4½" x 3½"

WEIGHTS.

Lathe on column.....	375 lbs.
Lathe, head only.....	175 lbs.
Column only.....	200 lbs.

A special countershaft can be furnished for this machine, if desired.

DESCRIPTION FIG. 12029.

This machine is similar in design to our No. 1 double-column polisher, but is much heavier and has a longer spindle, giving greater distance between wheels. Being of very rigid construction, wood or leather polishing wheels, or large buffs can be run at a very high speed.

The spindle is of steel, ground accurately, and runs in long babbitted bearings. It can be furnished with either single or tight and loose pulleys.

DIMENSIONS.

Height from base to center of spindle.....	22"
Diameter of spindle in bearings.....	2"
Diameter of spindle between flanges.....	1½"
Length of spindle.....	40"
Size of single pulley.....	5' x 3"
Size of tight and loose pulleys.....	5' x 3½"
Length of bearings.....	8"

WEIGHTS.

Lathe and countershaft, about.....	305 lbs.
Lathe only, about.....	425 lbs.
Countershaft only, about.....	170 lbs.

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4½", single pulley, 17" x 4½".

NEW PROJECTING POLISHING LATHE.



FIG. 12030.

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POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIG. 12031.

This machine is of extra heavy construction and will be found most satisfactory where a more substantial lathe than that shown in Fig. 12030 is required.

The spindle is of steel, turned and ground and run in long babbitted bearings. As shown, the countershaft is attached to the base, but the machine may be furnished with independent countershaft.

We can also furnish this machine with sliding head, allowing the use of lapped belts.

SPECIFICATIONS.

Height from base to center of spindle.....	42"
Height of head from base to center of spindle.....	20"
Diameter of spindle in bearings.....	1 3/4"
Diameter of spindle between flanges.....	1 1/2"
Length of spindle.....	42"
Size of pulley on spindle.....	4" x 5 1/2"
Length of bearings.....	7"
Projection center of spindle beyond center of base.....	20"

COUNTERSHAFT.

Tight and loose pulleys.....	8" x 4 1/2"
Driving pulley.....	16" x 4"
Diameter of shaft.....	1 1/2"

WEIGHTS.

Lathe, countershaft attached.....	500 lbs.
Lathe only.....	325 lbs.
Countershaft.....	175 lbs.

HEAVY PROJECTING POLISHING LATHE.



FIG. 12031.

MOTOR-DRIVEN POLISHING MACHINE.

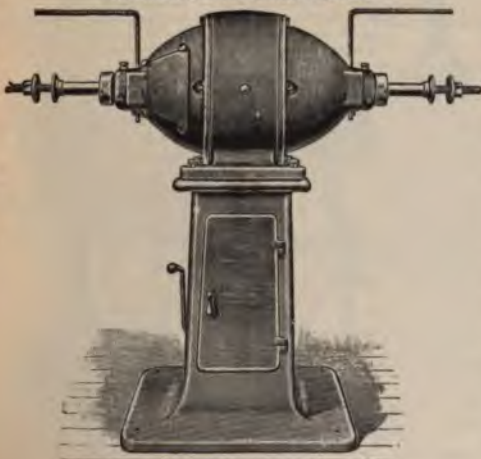


FIG. 12032.

DESCRIPTION FIG. 12032.

The accompanying cut shows a type of electrically driven polisher which we have lately placed on the market.

The column is heavy with a large base, thus reducing the vibration to a minimum, even when the machine is placed on a springy floor.

The head is secured to the column by a cast-steel field ring, thus making a very rigid machine. The spindle is of crucible steel, and case-hardened hexagon nuts are furnished with it. Collars are also provided to prevent dust from entering bearings.

The bearings are large, self-aligning, self-oiling and dustproof. They can also be easily renewed.

The motor is fully enclosed, but a very large air space has been provided to prevent heating.

The case-enclosing motor has been designed with the view to giving as much room as possible around the wheel, allowing large pieces of work to be handled easily, and adjustable supports for guards are provided.

Doors are placed in the motor case, giving ready access to the brushes.

The armature and commutator are on a quill entirely independent of the shaft. This arrangement allows a new shaft to be readily substituted.

The rheostat and starting switch, which are in the column, are of bronze, and the latter is operated from the outside by a handle, as shown on the left of the column.

Description continued on following page.

POLISHING AND BUFFING MACHINERY.



FIG. 12029.

DESCRIPTION FIG. 12029.

This machine is similar in design to our No. 1 double-column polisher, but is much heavier and has a longer spindle, giving greater distance between wheels. Being of very rigid construction, wood or leather polishing wheels, or large buffs can be run at a very high speed.

The spindle is of steel, ground accurately, and runs in long babbitted bearings. It can be furnished with either single or tight and loose pulleys.

DIMENSIONS.

Height from base to center of spindle.....	27"
Diameter of spindle in bearings.....	2"
Diameter of spindle between flanges.....	1 1/4"
Length of spindle.....	43"
Size of single pulley.....	3" x 3"
Size of tight and loose pulleys.....	3" x 3 1/4"
Length of bearings.....	

WEIGHTS.

Lathe and countershaft, about.....	266 lbs.
Lathe only, about.....	125 lbs.
Countershaft only, about.....	170 lbs.

COUNTERSHAFT.

The countershaft made for use with this lathe has tight and loose pulleys, 9" x 4 1/4", single pulley, 17" x 4 1/4".

DESCRIPTION FIG. 12030.

This machine has been designed to meet the demand for a very rigid projecting lathe, and its ample overhang allows the handling of large pieces.

It can be furnished mounted on column, as shown, or, if desired for bench work, without column.

The spindle is of steel, turned and ground and runs in long babbitted bearings. It can be furnished with single, tight and loose, or cone pulley.

DIMENSIONS.

Size of base.....	10" x 16 1/2"
Height from base to center of spindle.....	15 1/2"
Diameter of spindle in bearings.....	1 3/4"
Diameter of spindle between flanges.....	1"
Length of spindle.....	36"
Length of bearings.....	5 1/2"
Projection (center of spindle beyond center of base).....	15 1/2"
Height from base of column to center of spindle.....	38"
Size of tight and loose pulleys.....	4 1/2" x 3 1/4"

WEIGHTS.

Lathe on column.....	375 lbs.
Lathe, head only.....	175 lbs.
Column only.....	200 lbs.

A special countershaft can be furnished for this machine, if desired.

NEW PROJECTING POLISHING LATHE.



FIG. 12030.

POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIG. 12031.

This machine is of extra heavy construction and will be found most satisfactory where a more substantial lathe than that shown in Fig. 12030 is required.

The spindle is of steel, turned and ground and run in long babbitted bearings. As shown, the countershaft is attached to the base, but the machine may be furnished with independent countershaft.

We can also furnish this machine with sliding head, allowing the use of lapped belts.

SPECIFICATIONS.

Height from base to center of spindle.....	42"
Height of head from base to center of spindle.....	20"
Diameter of spindle in bearings.....	1 1/4"
Diameter of spindle between flanges.....	1 1/2"
Length of spindle.....	42"
Size of pulley on spindle.....	4" x 5 1/2"
Length of bearings.....	7"
Projection center of spindle beyond center of base.....	20"

COUNTERSHAFT.

Tight and loose pulleys.....	8" x 4 1/2"
Driving pulley.....	16" x 4"
Diameter of shaft.....	1 1/2"

WEIGHTS.

Lathe, countershaft attached.....	500 lbs.
Lathe only.....	325 lbs.
Countershaft.....	175 lbs.

HEAVY PROJECTING POLISHING LATHE.



FIG. 12031.

DESCRIPTION FIG. 12032.

The accompanying cut shows a type of electrically driven polisher which we have lately placed on the market.

The column is heavy with a large base, thus reducing the vibration to a minimum, even when the machine is placed on a springy floor.

The head is secured to the column by a cast-steel field ring, thus making a very rigid machine. The spindle is of crucible steel, and case-hardened hexagon nuts are furnished with it. Collars are also provided to prevent dust from entering bearings.

The bearings are large, self-aligning, self-oiling and dustproof. They can also be easily renewed.

The motor is fully enclosed, but a very large air space has been provided to prevent heating.

The case-enclosing motor has been designed with the view to giving as much room as possible around the wheel, allowing large pieces of work to be handled easily, and adjustable supports for guards are provided.

Doors are placed in the motor case, giving ready access to the brushes.

The armature and commutator are on a quill entirely independent of the shaft. This arrangement allows a new shaft to be readily substituted.

The rheostat and starting switch, which are in the column, are of bronze, and the latter is operated from the outside by a handle, as shown on the left of the column.

Description continued on following page.

MOTOR-DRIVEN POLISHING MACHINE.

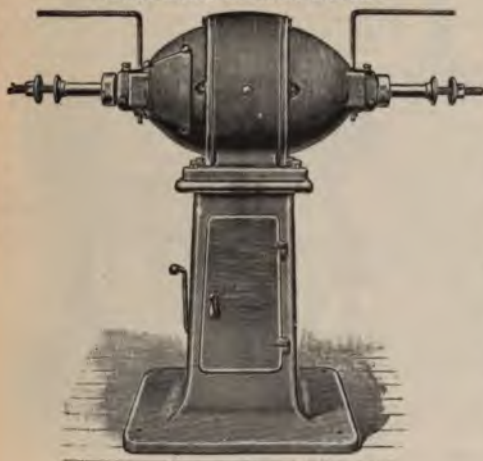


FIG. 12032.

POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIG. 12032.—Continued.

This machine is regularly fitted with D P switch and starting box, with no voltage release attachment. Automatic overload release attachment and regulating rheostat can be furnished, if desired. Sizes Nos. 1 and 2 can be used as grinders, if desired, by attaching rests, and for light work are very satisfactory. This machine is not carried in stock.

SPECIFICATIONS.

	No. 1.	No. 2.	No. 3.	No. 4.
Size of base.....	21" x 21"	24" x 24"	26" x 26"	28" x 28"
Height from base to center of spindle.....	41"	40"	39"	38"
Diameter of spindle in bearings.....	1"	1½"	1½"	1½"
Diameter of spindle between flanges.....	5⁄8"	1"	1¾"	1½"
Length of spindle.....	42"	51"	60"	68"
Length outside to outside of bearings.....	25½"	29"	32½"	35"
Diameter of body.....	14¾"	17¼"	19½"	21½"
Horse-power (approximate).....	1½	3	4½	7½
Speed (maximum), revolutions per minute.....	3,000	2,600	2,200	2,000
Weight machine complete, about.....	650 lbs.	725 lbs.	800 lbs.	850 lbs.

BELT-STRAINING ATTACHMENT "A."

Attached to Polishing Lathe on Column.



FIG. 12033.

teeth of rack shown fastened to the floor, holding it firmly. Pressing on the handle of the lever (projecting through the upright standard) will release it instantly from the teeth, when the jointed standard swings forward and releases the belt. The lever is provided with ears that fit into grooves cast in each side of the toothed rack on the floor, thereby keeping it always in place. The flanged pulleys are turned inside and out, and carefully balanced to run true.

It is built in two sizes, Nos. 1 and 2, which are alike in general arrangement, but the No. 2 is larger and heavier than No. 1. No. 1 attachment can be used with any grinding or polishing head having a spindle 1" between flanges, and No. 2 with any head having a spindle 1½" between flanges. With this attachment any length of belt may be used.

WEIGHTS.

No. 1.....	110 lbs.
No. 2.....	200 lbs.

DESCRIPTION FIG. 12033.

The head shown on column stands 8" from base to center of spindle. It can be furnished with single, tight and loose, or cone pulley, as desired. Diameter of spindle between flanges 1"; in the bearings 1½". The spindle is 30" long. The flange pulley can be easily removed and a buff or solid wheel used in its place. When changes of belts are required, it can be done almost instantly by slacking up the jointed standard, one end of which is firmly attached to the floor.

WEIGHTS.

Machine, attachment and countershaft complete.....	335 lbs.
Machine only.....	220 lbs.
Countershaft only.....	75 lbs.
Attachment only.....	60 lbs.

DESCRIPTION FIG. 12034.

This attachment can be fastened to any part of the floor. Arrangements for bracing are shown, which stiffen it. The lever shown with projecting handle through the upright jointed standard has a steel point at the end, which, when the operator tightens the upright standard, drops into the

BELT-STRAINING ATTACHMENT "C."



FIG. 12034.

POLISHING AND BUFFING MACHINERY.

DESCRIPTION FIG. 12035.

This machine consists of a rigid bed, planed straight on surface, with planed slot, upon which are clamped two heads, each having a steel spindle carrying a driving pulley between the bearings, and a flanged pulley close to boxes on the outside. A hand wheel at one end of the bed operates a square thread screw for drawing one of the heads along the bed to secure the proper tension for the belt. To facilitate the changing of belts, the other head is provided with a handle whereby it can be pushed quickly along the bed. Each head is clamped by a lever and cam, shown, and a slight movement is sufficient to release or tighten it. One spindle is provided with the regular arrangement for carrying leather-covered or cloth wheels on the end opposite the flanged pulley. An adjustable rest is furnished for flat work, as shown.

The machine is heavy, well built, and arranged to run at a high rate of speed. The bearings are of the best babbitt metal, and only the best material is used throughout. It is arranged to operate quickly, and adapted to all varieties of strapping and polishing work. It can be made of any desired length, with any width of flanged pulleys up to 6".

An overhanging head can be furnished to place on the right-hand end of machine, projecting about 2' over the bed, allowing the operator to get inside of a circle or ring, or other work of that class which could not be polished on the ordinary machine.

BELT-STRAPPING MACHINE D.

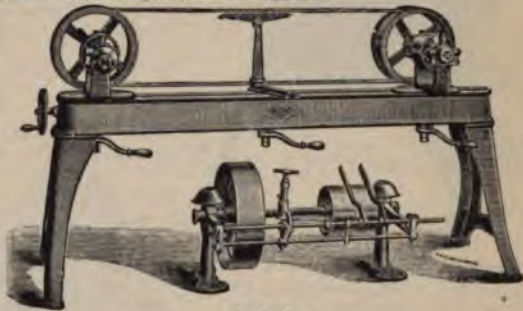


FIG. 12035.

DIMENSIONS.

Length of bed.....	6'	Diameter of spindle between flanges.....	1 1/4"
Height from floor to center of spindle.....	35 3/4"	Pulley on spindle.....	6" x 4 1/2"
Length of bearings, each.....	4"	Floor space.....	2' x 6'
Diameter of spindle in bearings.....	1 3/4"		

This machine is regularly furnished with two double flanged pulleys 14" x 2 3/4". Other sizes will be supplied at a reasonable rate.

WEIGHTS.

Complete with countershaft.....	825 lbs.	Overhanging head.....	135 lbs.
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DOUBLE-BELT POLISHING MACHINE.

DESCRIPTION FIG. 12036.



FIG. 12036.

This machine is designed so that two operators may work at one machine at the same time. The design of the machine is such that the good qualities of the ordinary belt strappers are retained together with the important feature of a great saving in floor space, the machine being self-contained and very compact. This style of machine is more expensive to make since an extra head for each belt is required, but we believe the better service given by it will more than repay the additional first cost. The arrangement admits of using long belts, thus giving long service without change, also having the advantage of the two guiding pulleys near together, so that less chance is afforded for the belt to slip away from irregular convex work.

The driving pulleys are placed at the bottom of the stand; the pulley shafts are of steel hardened and ground and run in self-oiling boxes. Idle pulley shafts run in bronze boxes. The idle pulley stands are clamped to the table by bolts which slide in T slots, thus allowing quick adjustment of belts. The pulleys are 2" between the flanges. The bearings are adequately protected by dust caps from emery dust and dirt. Belt guards are provided for protecting the operator and preventing injury to the belts.

DIMENSIONS.

Height from floor to top of belt.....	43"
Size of small flanged pulleys.....	6" x 2"
Size of large flanged pulleys.....	12" x 2"
Size of tight and loose pulleys on countershaft.....	6" x 2 3/4"
Distance between belt centers.....	26"

COUNTERSHAFT.

The countershaft furnished with this machine has tight and loose pulleys 9" x 3 3/4", driving pulley 20" x 4 1/4". It should run about 550 revolutions per minute.

WEIGHTS.

Machin and countershaft.....	800 lbs.
Machine only.....	660 lbs.
Countershaft only.....	140 lbs.



FIG. 12037.

GRINDSTONES.

DESCRIPTION FIG. 12037.

The illustration shows a high-grade grindstone mounted in an iron trough on legs. Iron shield, iron water bucket and pulley are furnished.

Made in three sizes as follows:

- 24" diameter by 3" thick stone.
- 30" diameter by 4" thick stone.
- 36" diameter by 6" thick stone.

We are also prepared to furnish a larger size trough suitable for stone up to 48" diameter. This large trough can be furnished with plain legs or with wheels so that it can be readily moved about the shop.

BLOWERS.

DESCRIPTION FIGS. 12038 AND 12039.

These fans are built either as blowers, with two inlets and a bearing on each side, as below, or as exhausters, with inlet on pulley side closed and with bearings above. They are distinctively volume fans, with limit of pressure at 4 or 5 ounces per square inch. The shells are of cast iron, and construction of same high grade as the steel pressure blowers.



FIG. 12038.

FIG. 12039.

No. of Blower or Exhaust.	Diameter and Face of Pulley.	Without Adjustable Bed.		Blower on Adjustable Bed.	
		Outside Diameter of Outlet.	Outside Diameter of Inlet of Exhaust.	Weight in Lbs., not Packed.	Weight in Lbs., not Packed.
0000	17" x 14"	24"	35"	11	11
00	25" x 17"	44"	45"	30	32
0	3" x 2 1/2"	45"	55"	45	50
1	3 1/2" x 2 1/2"	50"	61"	60	65
2	4 1/2" x 3 1/2"	71"	71"	95	100
3	5 1/2" x 4"	9"	9"	145	150
4	6" x 4 1/2"	105"	105"	210	225
5	6 1/2" x 5 1/2"	121"	121"	315	330
6	8" x 6"	145"	15"	530	550
7	8 1/2" x 7 1/2"	165"	165"	750	900
8	10 1/2" x 8 1/2"	185"	185"	1,200	1,400
9	12" x 10 1/2"	215"	215"	1,600	1,850
10	13 1/2" x 11 1/2"	245"	245"	2,550	2,700

These blowers and exhausters are regularly built with bottom horizontal discharge in all sizes, and with up-blast discharge in sizes 3 to 10 inclusive. They can be made down-blast or top horizontal discharge when so ordered. The weights given are for bottom horizontal discharge. Blowers are regularly made right hand, but can be made left hand to order. Exhausters are regularly made either hand.

DESCRIPTION FIG. 12040.

FAN BLOWER ON ADJUSTABLE BED WITH COUNTERSHAFT.

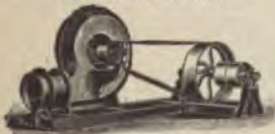


FIG. 12040.

Number of Blower.	Outside Diam. of Telescopic Outlet.	Diameter and Face of Pulley Driving on Fan Blower.	Dia. of Pulley Driven by Main Belt, from Lane Shaft.	Weight in Lbs., not Packed.
4	11 1/2"	6" x 4 1/2"	28"	10, 12, 14
5	13 1/2"	6 1/2" x 5 1/2"	32"	12, 14, 16
6	15 1/2"	8" x 6 1/2"	36"	12, 14, 16, 18
7	17 1/2"	8 1/2" x 7 1/2"	42"	14, 16, 18, 20
8	20 1/2"	10 1/2" x 8 1/2"	42"	18, 20, 22, 24
9	23 1/2"	12" x 10 1/2"	48"	18, 20, 22, 24
10	25 1/2"	13 1/2" x 11 1/2"	54"	18, 20, 22, 24

Nos. 4 to 10 inclusive are the only sizes regularly furnished with adjustable bed, or with combined adjustable bed and countershaft, but the other sizes can be thus fitted, when so ordered. Only bottom horizontal discharge blowers are regularly fitted up in this style. Tight and loose pulleys are furnished at a nominal additional price in place of the usual single countershaft pulley driven by main belt.

BLOWERS AND EXHAUSTERS.

STEEL PRESSURE BLOWER.



FIG. 12041.

SPECIFICATIONS FIGS. 12041 AND 12042.

No.	Diameter and Face of Pulley.	Blower without Adj. Bed.		Blower on Adjust. Bed.	
		Outside Diam. of Outlet.	Weight in Lbs. Not Packed.	Outside Diam. of Telescopic Outlet.	Weight in Lbs. Not Packed.
0000	1 1/2" x 1 1/2"	2 1/2"	17	.....	.....
00	2 1/4" x 1 1/2"	3 1/2"	35	.....	.....
0	3" x 2 1/2"	4"	55	.....	.....
1	3 1/2" x 2 1/2"	4 1/2"	75	.....	.....
2	3 3/4" x 2 1/2"	5 1/4"	95	.....	.....
3	4 1/4" x 3"	6 1/4"	155	.....	.....
4	5" x 3 1/2"	7 1/4"	225	8 1/2"	350
5	5 1/2" x 4"	8 1/4"	330	9 1/4"	500
6	6 1/4" x 4 1/2"	10 1/4"	460	11 1/4"	650
7	7 1/4" x 5 1/4"	12"	695	13"	1,000
8	9 1/4" x 6 1/4"	13 1/2"	870	15 1/2"	1,375
9	10 1/2" x 8"	16"	1,615	17 1/2"	2,300
10	12 1/2" x 9 1/4"	19 1/2"	2,100	19 1/2"	2,850

STEEL PRESSURE BLOWER ON ADJUSTABLE BED.



FIG. 12042.

These blowers are intended for pressures up to 16 ounces per square inch. Nos. 0000 to 3 inclusive have only one pulley, placed on right hand, as one faces outlet. Larger sizes have two pulleys. All sizes are regularly built to discharge horizontally at the bottom, but can be built to order to discharge either horizontally at the top, directly upward or directly downward. Bottom horizontal blowers Nos. 4 to 10 are the only sizes regularly furnished with adjustable bed.

DESCRIPTION FIG. 12043.

With the adjustable bed, upon which the blower may be moved by means of the shackle bolt, and the telescopic outlet, which allows for such movement without breaking pipe joints, it is possible to bring any desired tension on the belts while running. The bed is constructed of steel beams, and when combined with a countershaft, renders the entire apparatus self-contained and causes the belts to track evenly, run smoothly and wear well.

STEEL PRESSURE BLOWER ON ADJUSTABLE BED WITH COUNTERSHAFT.



FIG. 12043.

No. of Blowers.	Outside Diameter of Telescopic Outlet.	Diameter and Face of Blower Pulleys.	Diameter of Pulleys Driving Blower.	Diameter of Pulley Driven by Main Belts from Lion Shaft.	Weight in Lbs. Not Packed.
4	8 1/2"	5" x 3 1/2"	28"	10, 12, 14	700
5	9 1/4"	5 1/2" x 4"	32"	12, 14, 16	1,100
6	11 1/4"	6 1/4" x 4 1/2"	36"	12, 14, 16, 18	1,475
7	13"	7 1/4" x 5 1/4"	42"	14, 16, 18, 20	2,200
8	15 1/2"	9 1/4" x 6 1/4"	48"	18, 20, 22, 24	3,300
9	17 1/2"	10 1/2" x 8"	48"	18, 20, 22, 24	4,400
10	19 1/2"	12 1/2" x 9 1/4"	54"	18, 20, 22, 24	6,000

Bottom horizontal blowers Nos. 4 to 10 inclusive are the only sizes regularly furnished with combined adjustable bed and countershaft; but the other sizes can be thus fitted, when so ordered. Tight and loose pulleys are furnished at a nominal additional price in place of the usual single countershaft pulley driven by main belt.

DOUBLE PLANING MILL EXHAUSTER.



FIG. 12044.

DESCRIPTION FIGS. 12044 AND 12045.

The shell is of steel plate of such thickness as to withstand the abrading action of the material. A cast-iron support attached to the side of the shell carries the continuous oiling boxes with the shaft and pulley, and sustains the entire strain. The fan wheel is overhung upon the end of the shaft, thus leaving the inlet entirely unobstructed for the free passage of the material to be handled.

A double exhauster is applicable where the piping extends in opposite directions from the fan, for it permits of direct connection to the inlets and avoids elbows. The double type has less height for a given capacity.

SINGLE PLANING MILL EXHAUSTER.



FIG. 12045.

Size No.	Outside Diameter of Inlet.	Outside Diameter of Outlet.	Med. Speed.	Single Exhauster.		Double Exhauster.	
				Diameter and Face of Pulley.	Weight in Lbs.	Diameter and Face of Pulley.	Weight in Lbs.
30	11"	11"	2,425	5 1/2" x 5"	300	6 1/2" x 6"	500
35	13"	13"	2,075	6" x 6"	400	7 1/2" x 7"	750
40	15"	14 1/2"	1,825	6 3/4" x 6 1/4"	600	8" x 8"	1,000
45	17"	16 1/2"	1,625	8" x 7 1/2"	750	9 1/4" x 9 1/4"	1,250
50	19"	18 1/2"	1,450	8 1/2" x 8 1/2"	875	10 1/2" x 10 1/2"	1,625
55	21"	20 1/2"	1,325	9 1/2" x 9 1/2"	1,150	11 1/2" x 11"	1,900
60	23 1/2"	22 1/2"	1,225	10 1/4" x 10"	1,450	12" x 11 1/2"	2,250
70	25 1/2"	25 1/2"	1,050	12" x 10 1/2"	1,900	16" x 12 1/2"	3,200
80	30"	30"	900	13 1/4" x 11 1/2"	2,400	20" x 12 1/2"	4,000

These exhausters are built to discharge either horizontally at the top or bottom or directly upward. Down discharge fans can be built to order and are provided with rectangular outlets. All single exhausters are regularly built, either right or left hand. A right-hand fan has pulley on right-hand side as one faces outlet. The weights given are for bottom horizontal discharge fans not packed.

BLOWERS AND EXHAUSTERS.

OVERHEAD COUNTERSHAFT FOR BLOWER OR EXHAUSTER.



FIG. 12048.

DESCRIPTION FIG. 12048.

The shafts are of steel, boxes are lapped, and pulleys carefully balanced. Steel positive blowers, above No. 3, require two pulleys on countershaft. Smaller sizes and "Mason" and planing mill fans require only one. Tight and loose pulleys can be furnished to order.

Diameter of Pulley Driving Blower, in Ins.	Diameter of Pulley Driven by Main Belt from Line Shaft, in Ins.	Diameter of Shaft, in Ins.	PROPER SIZE FAN	
			Steel Pressure or "Mason" (0000)	S. F. Planing Mill Fans (Single, Double)
14	5½, 6	¾	0	
16	6, 7	1	0	
18	7, 8	1¼	1	
21	7, 8, 10	1¼	2	
24	8, 10, 12	1½	3	30
28	10, 12, 14	1¾	4	35
32	12, 14, 16	1¾	5	40, 45
36	12, 14, 16, 18	1¾	6	50, 55
42	14, 16, 18, 20	2	7	60
48	18, 20, 22, 24	2½	8, 9	70, 80
54	18, 20, 22, 24	2¾	9, 10	70, 80

DESCRIPTION FIGS. 12047 AND 12048.

The bodies of these blast gates are carefully adjusted to a nice sliding fit and provided with slides, which render them practically air tight. The lever pattern, when operated by cord, is convenient for inaccessible locations. Size given is outside diameter of collar where pipe slips on. Prices are the same for both slide and lever patterns.

Sizes: 1½", 2", 2½", 3", 3½", 4", 5", 6", 7", 8", 9", 10", 12", 14", 15", 16", 18", 20", 24", 30".

BLAST GATES FOR USE WITH BLOWERS AND EXHAUSTERS.



FIG. 12047.

FIG. 12048.

POSITIVE PRESSURE BLOWER FOR FOUNDRY CUPOLA.

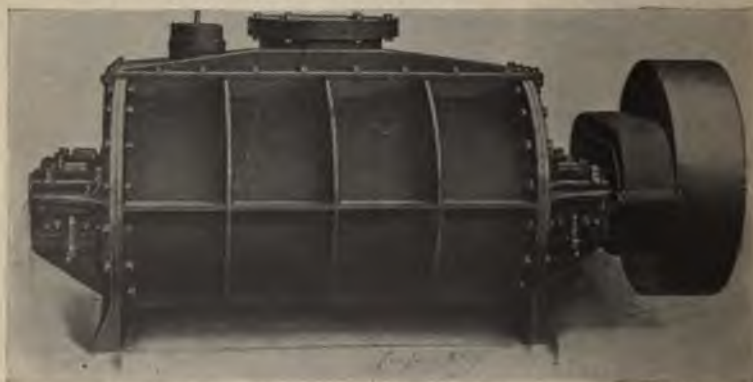


FIG. 12049.

DESCRIPTION FIG. 12049.

WITH NECESSARY HORSE-POWER AT 1 LB. PRESSURE.

- No. 1 Blower.—Discharges 3 cubic feet per revolution. Adapted to a cupola 23" to 27" inside lining.
 250 revolutions per minute will melt 1½ tons per hour. 3½ horse-power.
 280 revolutions per minute will melt 1¾ tons per hour. 4 horse-power.
 325 revolutions per minute will melt 1¾ tons per hour. 4½ horse-power.
- No. 2 Blower.—Discharges 5 cubic feet per revolution. Adapted to a cupola 28" to 30" inside lining.
 250 revolutions per minute will melt 2½ tons per hour. 5½ horse-power.
 275 revolutions per minute will melt 2½ tons per hour. 6 horse-power.
 300 revolutions per minute will melt 3 tons per hour. 7 horse-power.

BLOWERS AND EXHAUSTERS.

DESCRIPTION FIG. 12049.—Continued.

- | | |
|--|--|
| <p>No. 3 Blower.—Discharges 8 cubic feet per revolution. Adapted to a cupola 30" to 32" inside lining.
 225 R. P. M. will melt 31 tons per hour. 8 H. P.
 250 R. P. M. will melt 4 tons per hour. 9 H. P.
 275 R. P. M. will melt 4½ tons per hour. 10 H. P.</p> <p>No. 4 Blower.—Discharges 13 cubic feet per revolution. Adapted to a cupola 33" to 42" inside lining.
 175 R. P. M. will melt 4½ tons per hour. 10 H. P.
 220 R. P. M. will melt 5¾ tons per hour. 12½ H. P.
 270 R. P. M. will melt 7 tons per hour. 15 H. P.</p> <p>No. 5 Blower.—Discharges 20 cubic feet per revolution. Adapted to a cupola 42" to 48" inside lining.
 175 R. P. M. will melt 7 tons per hour. 16 H. P.
 225 R. P. M. will melt 9 tons per hour. 20 H. P.
 250 R. P. M. will melt 10 tons per hour. 22 H. P.</p> <p>No. 5½ Blower.—Discharges 29 cubic feet per revolution. Adapted to a cupola 48" to 54" inside lining.
 175 R. P. M. will melt 10½ tons per hour. 22 H. P.
 200 R. P. M. will melt 11½ tons per hour. 25 H. P.
 225 R. P. M. will melt 13½ tons per hour. 30 H. P.</p> <p>No. 6 Blower.—Discharges 37 cubic feet per revolution. Adapted to a cupola 54" to 60" inside lining.
 150 R. P. M. will melt 11 tons per hour. 24 H. P.
 180 R. P. M. will melt 13½ tons per hour. 29 H. P.
 210 R. P. M. will melt 15½ tons per hour. 34 H. P.</p> | <p>No. 6½ Blower.—Discharges 52 cubic feet per revolution. Adapted to a cupola 66" to 74" inside lining.
 145 R. P. M. will melt 15 tons per hour. 33 H. P.
 170 R. P. M. will melt 17½ tons per hour. 39 H. P.
 200 R. P. M. will melt 20½ tons per hour. 46 H. P.</p> <p>No. 7 Blower.—Discharges 63 cubic feet per revolution. Adapted to a cupola 66" to 78" inside lining.
 145 R. P. M. will melt 18 tons per hour. 40 H. P.
 170 R. P. M. will melt 21 tons per hour. 47 H. P.
 190 R. P. M. will melt 24 tons per hour. 52 H. P.</p> <p>No. 7½ Blower.—Discharges 83 cubic feet per revolution. Adapted to a cupola 74" to 90" inside lining.
 130 R. P. M. will melt 21 tons per hour. 47 H. P.
 150 R. P. M. will melt 25 tons per hour. 55 H. P.
 170 R. P. M. will melt 28 tons per hour. 62 H. P.</p> <p>No. 8 Blower.—Discharges 116 cubic feet per revolution. Adapted to a cupola 66" to 72" inside lining.
 120 R. P. M. will melt 27 tons per hour. 61 H. P.
 130 R. P. M. will melt 30 tons per hour. 66 H. P.
 150 R. P. M. will melt 35 tons per hour. 76 H. P.</p> <p>No. 9 Blower.—Discharges 106 cubic feet per revolution. Adapted to two cupolas 72" or three cupolas 60" inside lining.
 80 R. P. M. will melt 31½ tons per hour. 69 H. P.
 90 R. P. M. will melt 35 tons per hour. 77 H. P.
 100 R. P. M. will melt 39 tons per hour. 86 H. P.</p> |
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POSITIVE PRESSURE BLOWERS.

SPECIFICATIONS FIG. 12050.

Size No.	Cubic Feet Capacity per Revolution	Maximum Speed per Revolution	Fulley Sizes	Flange Power Required (Approximate) Pressure per Square Inch	Net Weight	Floor Space	Inlet and Outlet (From Pipe Size)
1A.....	15	600	3" x 1"	½	8 lbs.	23 lbs. 12" x 6¼"	1½"
2A.....	40	400	4" x 1½"	¾	8 lbs.	35 lbs. 15" x 6½"	2"
3A.....	100	300	6" x 2½"	1	8 lbs.	88 lbs. 22" x 14"	2½"
4A.....	280	250	9" x 3"	1	8 lbs.	160 lbs. 28" x 17"	3½"
5A.....	425	200	10" x 3"	1½	8 lbs.	210 lbs. 33" x 19"	4"
6A.....	600	200	12" x 4"	2	8 lbs.	285 lbs. 36" x 19"	4"
8A.....	1,000	200	14" x 4"	4	8 lbs.	375 lbs. 46" x 22"	5"
10A.....	1,650	200	18" x 6"	5	8 lbs.	890 lbs. 54" x 30"	6"
12A.....	3,400	200	20" x 6"	7	8 lbs.	1,480 lbs. 60" x 34"	8"

TYPE A.



FIG. 12050.

TYPE B.

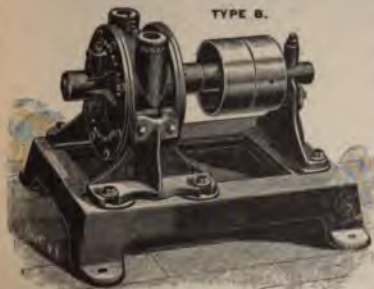


FIG. 12051.

SPECIFICATIONS FIG. 12051.

Size No.	Cubic Feet Capacity per Revolution	Maximum Speed per Revolution	Fulley Sizes	Flange Power Required (Approximate) Pressure per Square Inch	Net Weight	Floor Space	Inlet and Outlet (From Pipe Size)
1B..	15	600	3" x 1"	½	8 lbs.	38 lbs. 10" x 13"	1½"
2B..	40	400	4" x 1½"	¾	8 lbs.	52 lbs. 11" x 15"	2"
3B..	100	300	6" x 2½"	1	8 lbs.	140 lbs. 19½" x 23½"	2½"
4B..	280	250	9" x 3"	1	8 lbs.	230 lbs. 22½" x 29"	3½"
5B..	425	200	10" x 3"	1½	8 lbs.	310 lbs. 24½" x 35"	4"
6B..	600	200	12" x 4"	2	8 lbs.	400 lbs. 24½" x 38"	4"
8B..	1,000	200	14" x 4"	4	8 lbs.	780 lbs. 28" x 48½"	5"
10B..	1,650	200	18" x 6"	5	8 lbs.	1,125 lbs. 38" x 56"	6"
12B..	3,400	200	20" x 6"	7	8 lbs.	1,820 lbs. 42" x 62"	8"

AIR COMPRESSORS.



**TYPE D, ROTARY COMPRESSOR
OR VACUUM PUMP.**

SPECIFICATIONS FIG. 12052.

Size No.	Capacity in Cubic Inches per Revolution.	Maximum Speed, Revolutions per Minute.	Diameter of Pulley.	Face of Pulley.	Pressure Capacity per Square Inch.
1D.....	15	500	6"	2"	25 lbs.
2D.....	40	400	8"	2"	25 lbs.
3D.....	100	250	12"	4"	25 lbs.
4D.....	280	250	14"	4"	25 lbs.
5D.....	400	200	18"	6"	25 lbs.
6D.....	600	200	18"	8"	25 lbs.
8D.....	1,000	200	20"	8"	25 lbs.
10D.....	1,650	200	22"	10"	25 lbs.
12D.....	3,400	200	24"	10"	25 lbs.

Air receiver and valve can be furnished at extra cost, when desired.

FIG. 12052.

SINGLE, SELF-OILING, BELT-DRIVEN AIR COMPRESSOR, CLASS A.



FIG. 12053.

SPECIFICATIONS FIG. 12053.

Piston Displacement in Cubic Feet.	Revolutions per Minute, of Cylinder.	Diameter of Cylinder.	Strokes.	Air Pressure Designed for.	Horse-power Required.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel.	Frame Length.	Frame Width.
69	150	8"	8"	100	14	3"	2 1/2"	39"	1,000	6' 11"	2' 8"
88	150	9"	8"	85	16	3"	2 1/2"	39"	1,000	6' 11"	2' 8"
107	150	10"	8"	75	18	3"	2 1/2"	39"	1,000	6' 11"	2' 8"
155	150	12"	8"	50	20	3 1/2"	3"	48"	1,250	7' 6"	2' 8"
134	150	10"	10"	100	26	3"	2 1/2"	48"	1,250	7' 6"	2' 8"
194	150	12"	10"	75	32	3 1/2"	3"	48"	1,250	7' 6"	2' 8"
265	150	14"	10"	55	37	3 1/2"	3"	48"	1,250	7' 6"	2' 8"
237	150	12"	12"	100	47	3 1/2"	3"	57"		8' 8"	3' 0"
320	150	14"	12"	85	56	3 1/2"	3"	57"		8' 8"	3' 0"
415	150	16"	12"	60	61	4"	3 1/2"	57"		8' 8"	3' 0"
520	150	18"	12"	50	69	4"	3 1/2"	57"		8' 8"	3' 0"

Prices include all mountings, lubricators for air cylinder, necessary wrenches and foundation. Automatic unloading device is furnished with each compressor. For general description see

THE UNIVERSITY OF CHICAGO LIBRARY

AIR COMPRESSORS.

DUPLIX, SELF-OILING, TWO-STAGE, BELT-DRIVEN AIR COMPRESSOR.

CLASS C.



FIG. 12054.

GENERAL DESCRIPTION FIGS. 12053 TO 12056.

Frame.—The frame is entirely inclosed, allowing the crosshead pin, slides, main bearings and crank pins to run in a bath of oil, which is fed to the parts in copious quantities by the crank disks which dip into the oil chamber. The oil feed to all parts is positive, and lubrication starts and stops with the machine without attention. The oil, after being used, drains back to the chamber; around this chamber is cast a raised rib, which the oil must overflow in order to re-enter the chamber, thereby depositing any sediment outside the rib, from whence it may be drawn off. Any drip from the front stuffing box enters and can be drawn off from a separate chamber, preventing it from entering the oil chamber. This inclosed type of frame also thoroughly protects the parts from dust and grit preventing undue wear and allowing the machine to be located where most convenient. Crosshead slides are of the bored type, rigidly supported. Pillow blocks are of the heavy duty type, well tied into body of frame, the jaws being rigidly held by the heavy interlocking bearing cap. On all single compressors these frames are equipped with double bearings to permit of the center crank construction.

Sub-Base.—With the exception of the single, belt-driven, Class A compressors, each machine is mounted on a substantial iron sub-base, making the whole compressor self-contained, insuring rigidity and absolute alignment, and obviating the necessity of an expensive foundation.

Main Bearings.—The design and construction of the main bearings mark a decided improvement over usual methods. These bearings are of the half-box type, fitted with removable cast-iron shells lined with genuine babbitt. The babbitt is pinned in and bored. Bearing surfaces are unusually large and designed so that oil is not wiped off by close-fitting edges. The bearings are adjusted for wear by wedge and screw, the latter being provided with lock nut.

Crosshead.—The crosshead is a steel casting of the box pattern, fitted with removable cast-iron shoes, both top and bottom, having large wearing surfaces, and are adjustable by wedge and screw. The shoes, as shown in illustration, have alternate strips of babbitt. The wedge screw is firmly locked, and is relieved of all working strains by two heavy tie bolts which pass through the crosshead on a taper, being easily removed. The crosshead pin is of the best machine steel, hardened; it is of large diameter and is drawn into crosshead on a taper, being easily removed.

SPECIFICATIONS FIG. 12054.

Piston Displacement, in Cubic Feet.	Revolutions per Minute.	Diameter of Low- Pressure Cylinder.	Diameter of High- Pressure Cylinder.	Stroke.	Air Pressure Designed for.	Horse-power Required.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Machine in Lbs.	Flyer Space	
											Length.	Width.
210	150	14"	9"	8"	100	35	3½"	2½"	53"	1,450	7' 5"	4' 4"
342	150	16"	10"	10"	100	55	4"	2½"	60"	2,400	8' 3"	4' 8"
519	150	18"	12"	12"	100	87	4½"	3"	60"	3,500	9' 5"	5' 4"

Prices include all mountings, lubricators for air cylinders, necessary wrenches, and foundation plans. Automatic unloading device is furnished with each compressor.

AIR COMPRESSORS.

SINGLE, SELF-OILING, STEAM-DRIVEN AIR COMPRESSOR. CLASS D.



FIG. 12055.

GENERAL DESCRIPTION FIGS. 12053 TO 12056.—Continued.

Eccentric.—The inclosed self-oiling feature is also applied to the eccentric, by means of an eccentric case which is bolted to the base of main bearing, and in which eccentric operates. Oil is fed into case by crank disks, maintaining it at a constant level, and allowing the eccentric to dip into oil at each revolution. Oil drains back to frame as fast as fed into case.

Air Valves.—These are of the vertical lift, poppet type, wearing tight on their seats. Valves proper are of one piece, high-grade steel, and are very light, preventing hammering.

Both inlet and discharge valves work in bronze guides, which are securely locked. By the extension of the cylinder heads over the valves it is made impossible for a valve to be pulled into cylinder in case of breakage. Access is had to all valves without breaking pipe connections or gasketed joints.

Intercoler.—All two-stage compressors have the intercooler placed in sub-base, directly under air cylinders. It is made up of a large number of small brass tubes through which the water passes.

Tubes are placed close together, and by means of deflector plates the air is passed between the tubes in the form of thin sheets becoming thoroughly cooled. Cooling area exposed to air is very large and cooler has ample volume to supply high-pressure cylinder.

The cooler is entirely self-contained and can readily be removed from base. Intercoler is provided with safety valve.

Governor.—Each steam-driven compressor is equipped with a high-grade steam and pressure governor which automatically controls the speed of compressor in direct proportion to the amount of air consumed.

Unloading Device.—We equip each belt-driven compressor with an automatic unloading device, which, when pressure in receiver reaches a predetermined point, automatically opens a discharge valve on each end of cylinder, thus balancing the piston and preventing the further compression of air and consequent consumption of power until the pressure in receiver is reduced.

SPECIFICATIONS FIG. 12055.

Piston, Displacement, in Cubic Feet.	Revolutions per Minute	Size in Inches.			Air Pressure Developed (lb.)	Horse Power Required	Steam Supply	Steam Exhaust.	Air Inlet	Air Discharge.	Fly Wheel, Two.		Floor Space.	
		Steam Cylinder.	Air Cylinder.	Stroke.							Diameter.	Weight, lbs.	Length.	Width.
69	150	8	8	8	100	14	2"	2"	3"	2 1/2"	39"	800	8' 10"	4' 6"
88	150	8	9	8	85	16	1 1/2"	2"	3"	2 1/2"	39"	800	8' 10"	4' 6"
107	150	8	10	8	75	18	1 1/2"	2"	3"	2 1/2"	39"	800	8' 10"	4' 6"
155	150	8	12	8	50	20	2"	2"	3 1/2"	3"	39"	800	8' 10"	4' 6"
213	150	8	14	8	35	22	2"	2"	3 1/2"	3"	39"	800	8' 10"	4' 6"
134	150	10	10	10	100	36	2 1/2"	3"	3"	2 1/2"	48"	1,100	10' 4"	5' 0"
194	150	10	12	10	75	32	2 1/2"	3"	3 1/2"	3"	48"	1,100	10' 4"	5' 0"
265	150	10	14	10	55	37	2 1/2"	3"	3 1/2"	3"	48"	1,100	10' 4"	5' 0"
350	150	10	16	10	40	40	2 1/2"	3 1/2"	4"	3 1/2"	48"	1,100	10' 6"	5' 0"
*237	150	12	12	12	100	47	2 1/2"	3 1/2"	4"	3 1/2"	57"	1,700	12' 0"	5' 6"
*320	150	12	14	12	85	56	2 1/2"	3 1/2"	4 1/2"	3 1/2"	57"	1,700	12' 0"	5' 6"
*415	150	12	16	12	60	61	2 1/2"	3 1/2"	4 1/2"	3 1/2"	57"	1,700	12' 1"	5' 6"
*529	150	12	18	12	50	69	2 1/2"	3 1/2"	5"	3 1/2"	57"	1,700	12' 1"	5' 6"

The above sizes are standard. Our large stock of patterns enables us to furnish special combinations to suit any requirements. Prices include foundation plans, all mountings, lubricators for air cylinder, wrenches, etc.; also combined speed and pressure regulator.

* Steam cylinders 12" diameter and larger are equipped with Meyer adjustable cut-off valve gear.

AIR COMPRESSORS.

DUPLEX, SELF-OILING, TWO-STAGE, STEAM-DRIVEN AIR COMPRESSOR. CLASS F.

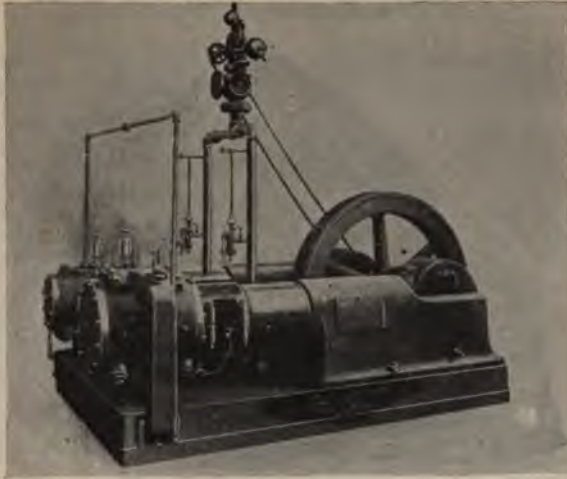


FIG. 12056.

GENERAL DESCRIPTION FIGS. 12053 TO 12058.—Continued.

Connecting Rod.—On all duplex compressors the connecting rod is of the solid-end type forged from one piece of high-grade machine steel. For all single machines we use the solid-end construction on the crosshead end and the standard marine construction on crank pin end, as illustrated. Crosshead and crank pin boxes are the best phosphor bronze.

Piston Rods.—The piston rods are of the best machine steel turned straight and true. They are secured in crosshead by a long coarse thread and jam nut, and are drawn into reamed taper holes in pistons and held by nut and lock.

Steam Cylinders.—In casting the steam cylinders we use a special grade of very hard, close-grained iron, which wears to a perfect surface. The steam ports are designed amply large to prevent wire drawing, and are short and direct. The steam cylinders are covered with mineral wool and lagged with Russia iron.

Air Cylinders.—The air cylinders are cast from the same grade of iron as the steam cylinders. The cylinder and valves are thoroughly jacketed, the valves being placed in the cylinder body vertically, thus utilizing to the greatest extent the cooling value of the heads, which are also jacketed. By our design the clearance is reduced to a minimum, thus effecting a very high volumetric efficiency.

Stuffing Boxes.—The stuffing boxes are large and deep; the air-head boxes are water jacketed. All stuffing boxes are readily accessible.

Fly-Wheel.—The fly-wheel is of large diameter, extra heavy weight, and has square rim section. The wheel is split, and is held together at the rim by wrought iron links and taper keys of large sectional area, and at the hub by four heavy bolts passing through deep lugs. The wheel is keyed to shaft.

Steam Valve.—The steam valve is of the D slide type, operated by the eccentric through a rocker arm supported from the side of frame. Valve and seat are scraped to a perfect bearing, making an absolutely tight valve, and one which operates with but slight friction. All steam cylinders 12" in diameter we equip with the Meyer adjustable cut-off valve gear.

SPECIFICATIONS FIG. 12056.

Piston Displacement, in Cubic Feet.	Revolutions per Minute.	Size, in Inches.					Air Pressure Designed for	Horsepower Required.	Steam Supply.	Steam Exhaust.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel.	Floor Space.	
		Steam Cylinders.	Low-Pressure Air Cylinders.	High-Pressure Air Cylinders.	Stroke	Length									Width.	
210	150	8	14	9	8	100	35	2"	2½"	3½"	2½"	53"	1,200 lbs.	8' 10"	5' 4"	
342	150	10	16	10	10	100	60	2½"	3"	4"	3"	60"	2,000 lbs.	10' 4"	5' 10"	
519	150	12	18	12	12	100	90	3½"	3½"	5"	3½"	60"	3,500 lbs.	11' 11"	6' 11"	

Prices include foundation plans, all mountings, lubricators for air cylinders, wrenches, etc.; also combi-

ulator.

AIR COMPRESSORS.

DUPLEX, SELF-OILING, BELT-DRIVEN AIR COMPRESSOR. CLASS B.



FIG. 12057.

For general description see pages 511 to 513.

SPECIFICATIONS FIG. 12057.											
Piston Displacement in Cubic Feet.	Revolutions Per Minute.	Diameter of Cylinder.	Stroke.	Air Pressure Designed for.	Horse-power Required.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel, Lbs.	—Floor Space—	
										Length.	Width.
138	150	8"	8"	100	28	3"	2½"	53"	1,450	6' 11"	4' 8"
176	150	9"	8"	85	32	3"	2½"	53"	1,450	6' 11"	4' 8"
214	150	10"	8"	75	36	3"	2½"	53"	1,450	7' 2"	4' 8"
310	150	12"	8"	50	40	3½"	3"	53"	1,450	7' 2"	4' 8"
427	150	14"	8"	35	44	3½"	3"	53"	1,450	7' 2"	4' 8"
268	150	10"	10"	100	52	3"	2½"	60"	2,400	8' 3"	4' 8"
388	150	12"	10"	75	64	3½"	3"	60"	2,400	8' 4"	4' 10"
530	150	14"	10"	55	74	3½"	3"	60"	2,400	8' 6"	5' 0"
700	150	16"	10"	45	85	4"	3½"	60"	2,400	8' 7"	5' 8"
474	150	12"	12"	100	94	3½"	3"	60"	3,500	9' 3"	5' 10"
640	150	14"	12"	85	112	3½"	3"	60"	3,500	9' 8"	6' 0"
830*	150	16"	12"	60	122	4"	3½"	60"	3,500	9' 8"	6' 8"
1,059	150	18"	12"	50	138	4"	3½"	60"	3,500	9' 10"	6' 8"

Prices include all mountings, lubricators for air cylinders, necessary wrenches, and foundation plans furnished with each compressor.

AIR COMPRESSORS.

DUPLIX, SELF-OILING, STEAM-DRIVEN AIR COMPRESSOR CLASS E.



FIG. 12056.

For general description see pages 511 to 513.

SPECIFICATIONS FIG. 12056.

Porton Displacement, in Cubic Feet.	Revolutions per Minute.	Size, in Inches.			Air Pressure Designed for.	Horsepower Required.	Steam Supply.	Steam Exhaust.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel.	Floor Space.	
		Steam Cylinders.	Air Cylinders.	Stroke.									Length.	Width.
138	150	8	8	8	100	28	2"	2 1/2"	3"	2 1/2"	53"	1,200	8' 10"	4' 0"
176	150	8	9	8	85	32	2"	2 1/2"	3"	2 1/2"	53"	1,200	8' 10"	4' 0"
214	150	8	10	8	75	36	2"	2 1/2"	3"	2 1/2"	53"	1,200	8' 10"	4' 0"
310	150	8	12	8	50	40	2"	2 1/2"	3"	3"	53"	1,200	8' 10"	4' 0"
427	150	8	14	8	35	44	2"	2 1/2"	3 1/2"	3"	53"	1,200	8' 10"	4' 0"
268	150	10	10	10	100	52	2 1/2"	3"	3"	2 1/2"	60"	2,000	10' 4"	4' 9"
388	150	10	12	10	75	64	2 1/2"	3"	3"	2 1/2"	60"	2,000	10' 4"	4' 10"
530	150	10	14	10	55	74	2 1/2"	3"	3"	2 1/2"	60"	2,000	10' 5"	5' 0"
700	150	10	16	10	45	85	2 1/2"	3"	4"	3 1/2"	60"	2,000	10' 6"	5' 0"
*474	150	12	12	12	100	94	2 1/2"	3 1/2"	5"	3 1/2"	66"	3,500	11' 11"	6' 10"
*640	150	12	14	12	85	112	2 1/2"	3 1/2"	5"	3 1/2"	66"	3,500	11' 11"	6' 10"
*830	150	12	16	12	60	122	2 1/2"	3 1/2"	5"	3 1/2"	66"	3,500	11' 11"	6' 11"
*1,058	150	12	18	12	50	138	2 1/2"	3 1/2"	5"	3 1/2"	66"	3,500	11' 11"	6' 11"

The above sizes are standard. Our large stock of patterns enables us to furnish special combinations to suit any requirements. Prices include foundation plans, all mountings, lubricators for air cylinders, wrenches, etc.; also combined speed and pressure regulators.

* Steam cylinders 12" diameter and larger are equipped with Meyer adjustable cut-off valve gear.

AIR COMPRESSORS.

DUPLIX, SELF-OILING, BELT-DRIVEN AIR COMPRESSOR. CLASS B.



FIG. 12057.

For general description see pages 511 to 513.

SPECIFICATIONS FIG. 12057.

Piston Displacement in Cubic Feet.	Revolutions Per Minute.	Diameter of Cylinder.	Stroke.	Air Pressure Designed for.	Horse-power Required.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel, Lbs.	Floor Space	
										Length.	Width.
138	150	8"	8"	100	28	3"	2½"	53"	1,450	6' 11"	4' 8"
176	150	9"	8"	85	32	3"	2½"	53"	1,450	6' 11"	4' 8"
214	150	10"	8"	75	36	3"	2½"	53"	1,450	7' 2"	4' 8"
310	150	12"	8"	50	40	3½"	3"	53"	1,450	7' 2"	4' 8"
427	150	14"	8"	35	44	3½"	3"	53"	1,450	7' 2"	4' 8"
268	150	10"	10"	100	52	3"	2½"	60"	2,400	8' 3"	4' 8"
388	150	12"	10"	75	64	3½"	3"	60"	2,400	8' 4"	4' 10"
530	150	14"	10"	55	74	3½"	3"	60"	2,400	8' 6"	5' 0"
700	150	16"	10"	45	85	4"	3½"	80"	2,400	8' 7"	5' 8"
474	150	12"	12"	100	94	3½"	3"	60"	3,500	9' 5"	5' 10"
640	150	14"	12"	85	112	3½"	3"	66"	3,500	9' 6"	6' 0"
830*	150	16"	12"	60	122	4"	3½"	66"	3,500	9' 8"	6' 8"
1,059	150	18"	12"	50	138	4"	3½"	66"	3,500	9' 10"	6' 8"

Prices include all mountings, lubricators for air cylinders, necessary wrenches, and foundation plans. Automatic unloading device is furnished with each compressor.

AIR COMPRESSORS.

DUPLIX, SELF-OILING, STEAM-DRIVEN AIR COMPRESSOR. CLASS E.



FIG. 12056.

For general description see pages 511 to 513.

SPECIFICATIONS FIG. 12056.

Revolutions per Minute.	Size, in Inches.			Air Pressure (Designated P.S.I.).	Horse power Required.	Steam Supply.	Steam Exhaust.	Air Inlet.	Air Discharge.	Diameter of Fly Wheel.	Weight of Fly Wheel.	Floor Space.	
	Steam Cylinders.	Air Cylinders.	Stroke.									Length.	Width.
150	8	8	8	100	28	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3"	2 1/2"	53"	1,200	8' 10"	4' 4"
150	8	9	8	85	32	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3"	2 1/2"	53"	1,200	8' 10"	4' 4"
150	8	10	8	75	36	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3 1/2"	3"	53"	1,200	8' 10"	4' 4"
150	8	12	8	50	40	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3 1/2"	3"	53"	1,200	8' 10"	4' 4"
150	8	14	8	35	44	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3"	3"	53"	1,200	8' 10"	4' 4"
150	10	10	10	100	52	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3 1/2"	3 1/2"	60"	2,000	10' 4"	5' 4"
150	10	12	10	75	64	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3"	3"	60"	2,000	10' 4"	5' 4"
150	10	14	10	55	74	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3"	3"	60"	2,000	10' 4"	5' 4"
150	10	16	10	45	85	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	3 1/2"	3 1/2"	60"	2,500	10' 4"	5' 4"
150	12	12	12	100	94	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	4"	3 1/2"	60"	2,000	10' 4"	5' 4"
150	12	14	12	85	112	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	5"	3 1/2"	60"	2,500	11' 11"	5' 4"
150	12	16	12	60	122	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	5"	3 1/2"	60"	3,500	11' 11"	5' 4"
150	12	18	12	50	138	12 1/2" x 12 1/2"	12 1/2" x 12 1/2"	5"	3 1/2"	60"	3,500	11' 11"	5' 4"

above sizes are standard. Our large stock of patterns enables us to furnish special combinations to suit any requirements. We include foundation plans, all mountings, lubricators for air cylinders, winches, etc.; also combined speed and pressure gauges. Cylinders 12" diameter and larger are equipped with Meyer adjustable cut-off valve gear.

AIR COMPRESSORS.

DUPLEX, SELF-OILING, MOTOR-DRIVEN AIR COMPRESSOR. CLASS EB.



FIG. 12059.

DESCRIPTION FIG. 12059.

There is an increasing demand for air compressors driven by electric motor, and we are prepared to adapt any of our belt-driven compressors to this type, either direct-connected or driven by noiseless chain. The enclosed construction of our compressors makes them especially advantageous as motor-driven machines.

In asking for quotations please specify voltage and current available.

VERTICAL RECEIVER.



FIG. 12060.

AIR RECEIVERS.

DESCRIPTION FIG. 12060.

Made of best 60,000 lbs. tensile-strength steel, sides double riveted, and tested to 200 lbs. These receivers are guaranteed for 110 lbs. working pressure.

Equipment includes pressure gauge, safety valve, drain cocks and flanged openings.

SPECIFICATIONS.

Diameter	Height	Thickness Shell	Thickness Head	Weight
20"	5'	$\frac{3}{8}$ "	$\frac{1}{4}$ "	200 lbs.
24"	6'	$\frac{1}{4}$ "	$\frac{3}{8}$ "	500 lbs.
30"	6'	$\frac{1}{4}$ "	$\frac{3}{8}$ "	700 lbs.
36"	6'	$\frac{1}{4}$ "	$\frac{3}{8}$ "	1,000 lbs.
36"	8'	$\frac{1}{4}$ "	$\frac{3}{8}$ "	1,200 lbs.
42"	8'	$\frac{1}{4}$ "	$\frac{3}{8}$ "	1,600 lbs.
48"	12'	$\frac{3}{8}$ "	$\frac{3}{8}$ "	2,800 lbs.
54"	12'	$\frac{3}{8}$ "	$\frac{3}{8}$ "	3,200 lbs.

TYPE A HOIST.



FIG. 12061

PNEUMATIC HOISTS.

DESCRIPTION FIGS. 12061 AND 12062.

TYPE A.

Valve is provided with automatic oiler.
Adjustable speed regulator permits valve to be set for all speeds; independent adjustment for raising and lowering.
Safety check prevents load falling suddenly in case of break in supply hose.
Exhaust from valve is carried to top and so arranged that only pure air from the compressor can be admitted to cylinder in lowering process. Keeps out grit and dust and saves the packing.
Automatic Cut-off.—Closes valve at any desired height of lift without attention from operator. The point of cut-off is fixed by position of clamp collar on piston rod; this collar is clamped on and rod cannot be marred.
Top Safety Check.—A simple arrangement at top of hoist prevents piston from flying up in case load should become detached. Any unusual pressure of exhaust automatically closes opening and air remaining in cylinder checks upward motion of piston.
Swivel Hook.—Has both rotating and swiveling movements. Has distinct advantages over other devices used in its strength and simplicity.
Type A Hoist.—Equipped with special features as above is suitable for the most delicate work, and is one of the most sensitive hoists made.

TYPE B.

Type B hoists in all essential features are similar in construction to Type A. The same designs of cylinders, pistons, and other vital parts are used.
Valve has automatic oiler. Exhausts direct.
Hook is forged on end of piston rod, which reduces the length of the hoist to the minimum. Swivel hook will be furnished without extra charge if specified by purchaser.
Speed regulator, safety check, automatic cut-off, exhaust attachment and top safety check are features not supplied with type B hoists.

TYPE B HOIST.



FIG. 12062.

The table below gives standard sizes with capacities and other data. The capacity varies in proportion to the pressure—the quantity of free air is directly proportional to the load.
Factor of safety allowed is ample for all sizes for the maximum rated capacity.

SPECIFICATIONS.

Size, Inside Diam. of Cylinder,	Capacities, Nominal Lifting Capacity in Lbs. At Air Pressure of from 90 to 100 lbs.	Add to Stroke to Get Shortest Distance be- tween Bearing Points of Hooks.		Approximate Net Amount of Free Air Used in One 4' Lift, In Cubic Feet.	Approximate Shipping Weights of Hoists.	
		Type A.	Type B.		Standard Hoist.	Additional 12' of Stroke.
3 1/4"	350 to 600	17 1/4"	11"	1.2 to 2.	110	10
4"	650 to 1,100	18"	10 3/4"	1.4 to 2.6	120	15
5"	1,000 to 1,700	19"	10 1/4"	2.7 to 4.2	150	20
6"	1,500 to 2,500	21 3/4"	12"	3.9 to 5.9	175	25
6 1/2"	1,700 to 2,800	21 3/4"	12"	4.6 to 7.	190	28
7"	2,000 to 3,300	23"	12"	5.5 to 8.	200	30
7 1/4"	2,300 to 4,000	23 1/4"	14 1/4"	6. to 9.2	220	35
8"	1,500 to 2,500	21 1/4"	12"	3.9 to 5.9	425	40
7"	2,000 to 3,300	23"	13 1/4"	5.5 to 8.	475	60
8"	2,500 to 4,500	23 1/4"	14 1/4"	7. to 10.8	625	100
9"	3,500 to 5,500	25 1/2"	16 1/2"	8.5 to 13.	700	110
10"	4,000 to 7,000	26"	16 3/4"	11.2 to 17.1	775	120
12"	6,000 to 10,000	29 1/4"	17 1/4"	15.4 to 23.6	1,000	145
14"	8,000 to 13,000	29 1/2"	19 1/4"	21.3 to 32.8	1,200	160
16"	10,000 to 18,000	32 1/4"	22 1/4"	27.9 to 42.2	1,650	175
18"	12,000 to 23,000	39 1/4"	26 1/4"	35.4 to 54.3	1,900	200
20"	16,000 to 28,000	41 1/4"	29"	42.2 to 65.6	2,300	250
24"	24,000 to 40,000	41"	26 1/2"	62.6 to 96.	3,250	300

Hoists with lifts from 4' to 8' are standard sizes ordinarily used.

PNEUMATIC HOISTS.

CLASS A HOIST. 5,000 LBS. CAPACITY.



FIG. 12063.

In the class C hoist all vibration is reduced to a minimum.

When ordering, state which class hoist is desired, also distance from eyebolt to floor, in order that proper length of chain may be furnished with hoists.

SPECIFICATIONS.

CLASS A HOISTS.

Capacity.....	1,500 lbs.	3,000 lbs.	5,000 lbs.	10,000 lbs.
Weight.....	160 lbs.	290 lbs.	425 lbs.	575 lbs.
Speed, per minute, at 80 lbs. air pressure.....	10' to 13'	10' to 13'	10' to 13'	10' to 13'
Standard lift.....	10'	10'	10'	10'

CLASS B HOISTS.

Capacity.....	800 lbs.	1,500 lbs.	2,500 lbs.
Weight.....	160 lbs.	290 lbs.	425 lbs.
Speed, per minute, at 80 lbs. air pressure.....	28' to 38'	28' to 36'	28' to 36'
Standard lift.....	10'	10'	10'

DESCRIPTION FIGS. 12063 TO 12066.

A hoist that takes up little head room and will positively hold its load has long been desired. We beg to call your attention to the accompanying illustrations and descriptions of our perfected pneumatic motor chain hoists, which are light and take up about the same head room as the hand-power differential hoists. They are easily handled and are under the perfect control of the operator to start, stop and hold load at any point. They do not depend upon air pressure to sustain load. These hoists can be suspended upon a trolley and run in any direction or upon a boom of jib crane, or in any position where a block and fall can be used.

One reversible motor is attached to the side plates. This motor has a pinion on each end of piston shaft, which meshes into driving-gear wheels, which in turn operate the main shaft, upon which sprocket wheels are placed for the chain to run over.

Being a chain hoist, any length of lift desired can be obtained; but unless otherwise ordered we furnish with each hoist 25' of chain, which gives a lift of about 10'.

These hoists are classed under three heads, A, B, and C. Class A hoists are constructed on the differential principle, and are not dependent upon brake or other contrivance to sustain load. Will lift from 10' to 13' per minute under an air pressure of 80 lbs.

Class B hoists are so constructed that a friction brake holds the load positively; are more rapid in action, and will lift from 28' to 36' per minute under the same pressure.

Class C hoists have the same capacities as Class A hoists, but lift at a much increased speed. They hold their loads by means of a friction on motor shaft, as is the case with the Class B hoist. Under 80 lbs. air pressure they lift at the rate of 15' to 20' per minute.

CLASS B HOIST. 1,500 LBS. CAPACITY.



FIG. 12064.

PNEUMATIC HOISTS.

DESCRIPTION FIGS. 12063 TO 12066.—Continued.

CLASS C HOISTS.

In this class of hoist all vibration is reduced to a minimum. They are therefore especially desirable where vibration is an objection and particularly advantageous for use in foundries.

Made in following capacities: 1,500, 3,000, 5,000 and 10,000 lbs.

Speed, 15' to 20' per minute under 80 lbs. air pressure.

Usual lift, 10'; longer lift can be supplied at a slight additional cost.

Dimensions and approximate weights, same as Class A hoists of corresponding capacities.

SPECIAL HOIST FOR THE QUICK LIFTING OF LIGHT LOADS.



FIG. 12066.

QUICK-LIFTING HOISTS.

Lifts and holds load with either hook.

Made in following sizes:

Capacities.	Weights.	Size Hose Required.
400 lbs.	140 lbs.	3/4" inside diameter
650 lbs.	250 lbs.	3/4" inside diameter
1,000 lbs.	400 lbs.	1" inside diameter

Dimensions: Length over all, 21", 28" and 31" respectively; width over gears, 15 1/2", 17 1/2" and 21" respectively.

Speed, 50' to 60' per minute under 80 lbs. air pressure.

PNEUMATIC RIVETERS.

DESCRIPTION FIGS. 12067 TO 12070.

These machines are designed primarily for operation by compressed air, but may be operated by steam if desired.

They are indispensable tools for bridge builders, contractors in architectural iron work and similar lines where riveting is one of the principal features of the work.

CLASS C HOIST.



FIG. 12065.

BOILER RIVETER, SUSPENDED HORIZONTALLY.

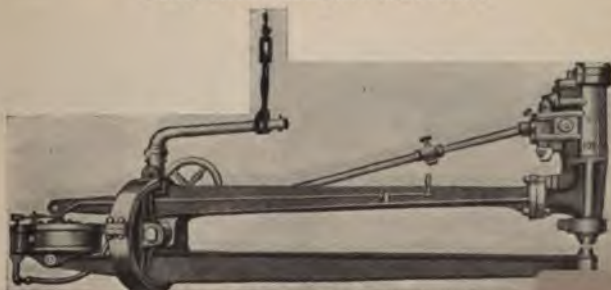


FIG. 12067.

PNEUMATIC RIVETERS.

85° RIVETER WITH 12" CYLINDER.



FIG. 12066.

COMPRESSION LEVER RIVETER IN OPERATION WITH ANGLE LEVER.



FIG. 12069.

DESCRIPTION FIGS. 12067 TO 12070.—Continued.

SPECIFICATIONS.
Regular "Jaw" Riveters.

Reach.	Gap.	Cylinder.	Capacity, Rivets.	Cubic Feet.	Weight in lbs.	
					Net.	Gross.
19"	9½"	8"	½"	17	635	800
48"	10"	8"	½"	49	1,025	1,200
72"	9"	8"	½"	74	1,800	2,100
101½"	15"	10"	1"	10	915	1,085
17½"	15"	10"	1"	16	1,100	1,300
25"	15½"	10"	1"	25	1,300	1,525
34½"	15"	10"	1"	37	1,800	2,125
36"	20"	10"	1"	40	2,050	2,375
47"	15"	10"	1"	53	2,775	3,075
25"	15"	12"	1½"	37	1,900	2,180
25"	20"	12"	1½"	48	2,000	2,300
36"	20"	12"	1½"	57	3,350	3,730
40"	22"	12"	1½"	65	3,170	3,620
55"	20"	12"	1½"	86	4,400	4,850
66"	20"	12"	1½"	91	4,350	4,800
66"	15½"	12"	1½"	102	4,700	5,200

PNEUMATIC RIVETERS.

DESCRIPTION FIGS. 12067 TO 12070.—Continued.

LATTICE RIVETER.

Reach.	Gap.	Cylinder.	Capacity.	Net Weight.
6'	8½"	8"	5½"	533 lbs.

ALLIGATOR RIVETERS.

12½"	14"	10"	1"	1,250 lbs.
9"	6"	10"	1"	1,200 lbs.

COMPRESSION LEVER RIVETERS.

ANGLE ARM

8"	13½"	10"	¾"	1,085 lbs.
9½"	14"	11½"	1"	1,260 lbs.

CHANNEL ARM

8"	8½"	10"	¾"	1,085 lbs.
9½"	8½"	11½"	1"	1,260 lbs.

BOILER RIVETERS.

72"	....	3½"	1"	1,300 lbs.
84"	....	3½"	1¼"	1,500 lbs.
96"	....	3½"	1¾"	1,750 lbs.

LATTICE COLUMN RIVETER, 8" CYLINDER.



FIG. 12070.

PNEUMATIC HAMMERS.

PNEUMATIC RIVETING HAMMER.



FIG. 12071.

PNEUMATIC CHIPPING HAMMER.



FIG. 12072.

DESCRIPTION FIGS. 12071 AND 12072.

All parts are made from suitable material. Working parts hardened and ground, and all parts are interchangeable.

The hammers are guaranteed against defective material or workmanship.

A desirable feature in our long stroke, or riveting hammers, is the one-piece construction, handle and barrel being in one piece.

We furnish 2", 3" and 4" chipping and 6" 8" and 9" riveting hammers. Other sizes to order.

PNEUMATIC DRILLS.

SIZE X, COMBINATION WOOD-BORING AND BREADST DRILL.



FIG. 12073.

SIZE C, AIR DRILL FOR HEAVY WORK.

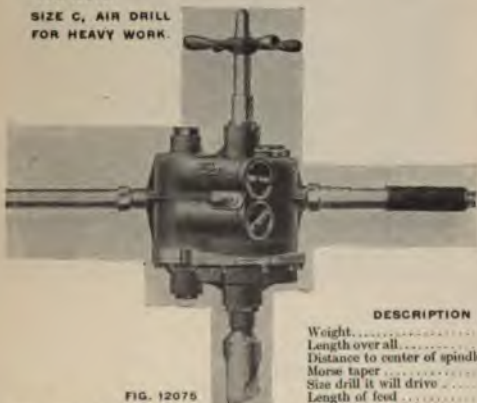


FIG. 12075

SIZE U, AIR DRILL REVERSIBLE.



FIG. 12077.

DESCRIPTION FIG. 12076.

Weight.....	20 lbs.
Length over all.....	10 1/2"
Length of feed.....	4"
Distance to center of spindle.....	2 1/2"
Morse taper.....	No. 2
Size drill it will drive in iron.....	1 1/2"
Size drill it will drive in wood.....	3"
Revolutions per minute at 80 lbs., forward.....	300
Revolutions per minute at 80 lbs., backward.....	225

DESCRIPTION FIG. 12073.

Weight.....	10 lbs.
Length over all.....	13 1/4"
Length of feed.....	2 1/4"
Distance to center of spindle.....	1 1/4"
Size drill it will drive in wood.....	1 1/2"
Size drill it will drive in iron.....	1"
Revolutions per minute at 80 lbs., single gear.....	600
Revolutions per minute at 80 lbs., compound gear.....	1,200

DESCRIPTION FIG. 12074.

Weight.....	9 lbs.
Length over all.....	12 1/2"
Length of feed.....	2 1/4"
Distance to center of spindle.....	1 1/4"
Size drill it will drive in iron.....	3/4"
Size drill it will drive in wood.....	1"
Revolutions per minute at 80 lbs.....	1,200

SIZE I, IRON OR WOOD-BORING DRILL.



FIG. 12074.

DESCRIPTION FIG. 12075.

Weight.....	13 lbs.
Length over all.....	11 1/4"
Length of feed.....	4 1/2"
Distance to center of spindle.....	3 1/2"
Morse taper.....	No. 4
Size drill it will drive in iron.....	2"
Revolutions per minute at 80 lbs.....	200

SIZE G, AIR DRILL FOR LIGHT WORK.

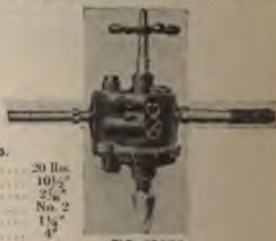


FIG. 12076.

DESCRIPTION FIG. 12076.

Weight.....	20 lbs.
Length over all.....	10 1/2"
Distance to center of spindle.....	2 1/2"
Morse taper.....	No. 2
Size drill it will drive.....	1 1/2"
Length of feed.....	4"

DESCRIPTION FIG. 12077.

Weight.....	20 lbs.
Length over all.....	10 1/2"
Length of feed.....	4"
Distance to center of spindle.....	2 1/2"
Morse taper.....	No. 2
Size drill it will drive in iron.....	1 1/2"
Size drill it will drive in wood.....	3"

SIZE O, AIR DRILL REVERSIBLE.

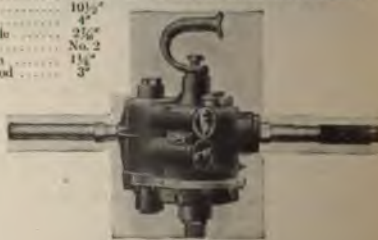


FIG. 12078.

MILWAUKEE TOOL CO. MILWAUKEE, WIS.

PNEUMATIC DRILLS.

SIZE M, AIR DRILL REVERSIBLE.

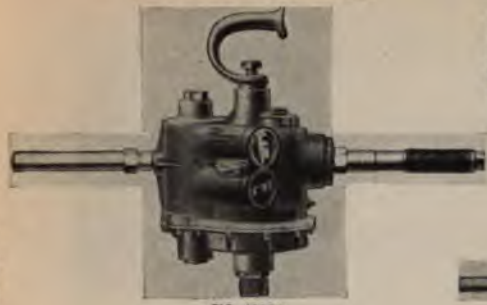


FIG. 12079.

DESCRIPTION FIG. 12080.

Weight.....	30 lbs.
Length over all.....	125 ¹ / ₂ "
Length of feed.....	4 ¹ / ₂ "
Distance to center of spindle.....	2 ¹ / ₂ "
Morse taper.....	No. 3
Size drill it will drive.....	1 ³ / ₄ "
Revolutions per minute at 80 lbs.....	420

DESCRIPTION FIG. 12079.

Weight.....	45 lbs.
Length over all.....	141 ¹ / ₂ "
Length of feed.....	4 ¹ / ₂ "
Distance to center of spindle.....	3 ¹ / ₂ "
Morse taper.....	No. 4
Size drill it will drive in iron.....	3"
Revolutions per minute at 80 lbs., forward.....	190
Revolutions per minute at 80 lbs., backward.....	127

SIZE E, AIR DRILL FOR MEDIUM WORK.

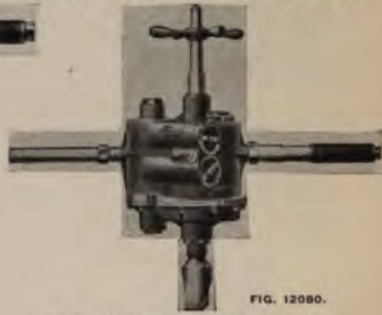


FIG. 12080.

NO. 2 PNEUMATIC DRILLING AND TAPPING MACHINE.



FIG. 12081.

DESCRIPTION FIG. 12081.

This tool will drill or tap either right or left hand and back-out drill or tap without removing from chuck.

It is extremely powerful, perfectly balanced and always under the instantaneous control of the operator.

The circular gear rack on top of bowl, upon which the pinion gear of the motor runs, is made in a separate piece, so that if any teeth are broken, a new gear rack can be supplied which can readily be placed on old bowl.

Weight, 42 lbs.
Capacity, 1³/₄".

DESCRIPTION FIG. 12082.

This tool is designed for use where very accurate drilling is desired. It is of the same size and capacity as drill shown on opposite page. It is mounted upon a holder having an upright arm 36" long, and a horizontal arm 30" long, with 7" positive feed in carrier, thereby making a portable radial drill.
Weight, complete, 160 lbs.
Capacity, 1³/₄".

NO. 2 REVERSIBLE DRILL ON STAND.



FIG. 12082.

ELECTRIC CRANES AND HOISTS.

CRANE TROLLEY.

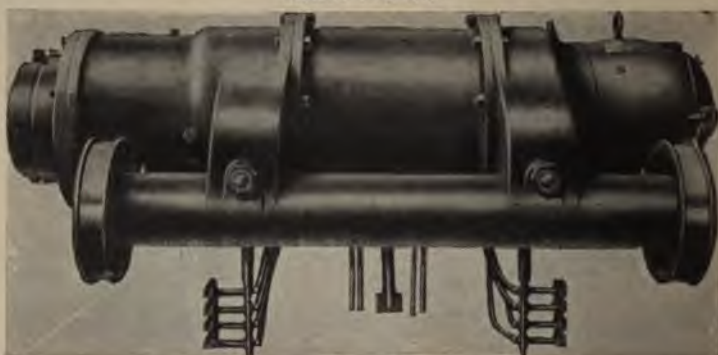


FIG. 12083.

DESCRIPTION FIGS. 12083 TO 12085.

On account of their necessarily unfavorable situation for supervision and cleanliness, cranes are subject to neglect. The resulting accumulation of foreign matter, and insufficient lubrication, account for most of the troubles experienced.

In general, these cranes and hoists follow the lines of the best modern crane practice, but they are the first to have their working parts fully and adequately enclosed, and a system of lubrication sufficiently simple and positive to insure economical and reliable service, with ordinary care.

Attention is invited to the fact that these cranes of the lighter capacities are duplications on a smaller scale of the larger sizes and are not improvised from standard parts intended for heavier cranes at relatively higher prices.

The Trolley.—Motors, electric brake, mechanical brake, gearing, etc., are employed in the usual manner, but to enable each of these to perform its work with the greatest reliability and durability relative to each other, all running parts, except the winding mechanism and wheels, are enclosed within the main frame of the trolley. This frame is so shaped as to form a compact and rigid foundation for the working parts, and at the same time a most effective enclosure. The shafts with their attached parts are completely within the enclosure, and there are, therefore, no openings through which oil or dust can pass. Because of this feature, it is practicable to fill the enclosures with oil, which will not leak out, evaporate, or become charged with grit.

The hoist gearing and brakes are secured for operation by bolting the cover of the enclosure in place. The removal of this cover makes them immediately accessible for inspection and repairs.

Gearing.—The gearing, by means of which motors move the trolley along the crane bridge, and the crane along the runway, are located in dust- and oil-tight cases. The covers of these cases are readily removable, and the gearing may be operated and inspected while the case is open.

The trolley motor transmits its motion to one trolley wheel on each girder of the crane bridge.

The bridge motor transmits its motion to one truck wheel on each runway through a liberal-sized squaring shaft carried in ring-oiled bearings.

Brakes.—All brake surfaces in these cranes and hoists are made of anti-friction materials, of adequate area, to produce the necessary amount of holding power, when thoroughly and evenly lathed with oil, in dust- and oil-tight cases. Maximum reliability and minimum loss of adjustment from wear are obtained in this manner.

The mechanical or load brake is so arranged that the frictional surfaces are at rest when the load is being hoisted. When power is wasted, and the disabling of this brake would in no way affect the safety with which the load is lifted. The brake, in the gearing enclosure, accomplishes rapid heat radiation, perfect lubrication and protection, and instant access

Description continued on page 536.

ELECTRIC CRANES AND HOISTS.

FIVE-TON CRANE, STANDARD TYPE, FOUNDRY SERVICE.



FIG. 12084.

TEN-TON CRANE, REGULAR TYPE, MACHINE ERECTING SERVICE.



FIG. 12085.

ELECTRIC CRANES AND HOISTS.

DESCRIPTION FIG. 12082 TO 12086.—Continued.

The electric hoist, which is of the familiar disk type, is not applied directly to the crane, but through connection of the motor shaft. This arrangement leaves the motor free of all complications, and derives the additional load which these connections of hoist and crane produce.

The load hoist acts directly on the hoist line of one of the hoist motor gears. It is applied by a spring, and released by a hot rod, so that the full amount of hoist power is available, irrespective of the weight of the crane operation. When the crane is in use, the hoist is not full power.

Hoistings.—Treads and trolley wheel bearings are of liberal proportions, bronze lined, and they ride on heavy stamped wheels. The trolley wheel bearings are of the "self-aligning" type.

Hoists.—Crane hoists are so designed and proportioned as to show little vertical or lateral deflection in service—the end cross falling consistently below those usually specified.

The action of gears is rated to meet conditions of loading, span, and speed specified.

Trolleys.—Trolleys are entirely of structural steel, of open-box construction, completely surrounding the track wheels, which are double flanged, with chilled and ground treads.

Controls.—The range of lifting speeds provided, is unusually wide, the intermediate gears progressing in almost imperceptible steps.

Fans and blow-out magnets are provided, and all contacts are easily accessible without opening the controller, or disturbing any of the connections.

Motors.—Crane can be provided with any of the various standard crane motors, but the manufacturer strongly recommends the use of "Inter-pole" motors, which are especially built for application to these cranes, and are kept in stock. These motors are so wound as to automatically approximate their speed to the loads handled, so that light and medium loads are moved at relatively high speeds, and maximum loads at relatively slow speeds. These favorable results are coupled with absolutely sparkless commutation.

Hoisting Cable.—Crane are equipped with wire rope only, and that of the highest quality obtainable. The flattened steel type is used, which stands 150 per cent greater wearing surface than the ordinary lay.

TRANSFER BRIDGE CRANE.



FIG. 12086.

DESCRIPTION FIG. 12086.

These cranes are built for capacities of from one to ten tons—any span. This system of employing crane and spars provides crane service to a maximum area at minimum expense in machine shops, lumber yards, and yards for storage of pig iron, structural steel, rail, blocks, or castings.

CRANES AND HOISTS.

ELECTRIC CRANE FOR ICE PLANTS.



FIG. 12087.

DESCRIPTION FIG. 12087.

Light, easy running cranes, one motor, single-hook type, for ice plants, can plants, etc.
Also built with two or three motors, double hook, for plate plants.

JIB CRANE.

JIB CRANE.

DESCRIPTION FIG. 12088.

Built with either electric or pneumatic motors in cantilever or front braced type. Suitable for steel and iron foundries. Design affords maximum head room.

HAND CRANE.

DESCRIPTION FIG. 12089.

These hand cranes are built in capacities of 15 tons and under. Light cranes are made single I beam and heavy cranes of construction identical with that of the electric cranes, except that hand chains replace the electric motors.



FIG. 12088.

HAND CRANE.



FIG. 12089.

ELECTRIC HOIST.



FIG. 12090.

ELECTRIC HOIST.

DESCRIPTION FIG. 12090.

The construction of these electric hoists is similar to that of electric crane trolleys, above described. These hoists are equipped with single I beam trolleys, plain, geared or motor-driven, and are floor or cage controlled.

For jib crane and elevator service, the hoists are provided with a cast iron base, for mounting in a stationary position.

Electric hoists are built in the sizes given in table below.

SPECIFICATIONS.

Size of Hoist.	Maximum Lift of Load Hook.	Size of I Beam.	HOISTING SPEED IN FEET PER MINUTE.						
			10'	12'	15'	20'	24'	30'	40'
A2	25'	8"	4,000 lbs.			2,000 lbs.			1,000 lbs.
A4	25'	8"				4,000 lbs.			2,000 lbs.
B6	20'	10"	10,000 lbs.	8,000 lbs.		6,000 lbs.	5,000 lbs.	4,000 lbs.	
B12	20'	10"					10,000 lbs.	8,000 lbs.	
C12	25'	12"						8,000 lbs.	
C15	25'	12"			20,000 lbs.	15,000 lbs.			10,000 lbs.
		12"				15,000 lbs.			8,000 lbs.

CRANES AND HOISTS.

STANDARD CAGE CONTROLLED ELECTRIC HOISTS.



FIG. 12091.

DESCRIPTION FIG. 12091.

Operator has unobstructed view of load from seat. Motors, gearing and brakes accessibly inclosed, making entire machine dust and weather proof.

These machines are adapted for hard continuous use in shop and intershop service. Capacities one to ten tons.



FIG. 12092



FIG. 12093.

TROLLEYS.

DESCRIPTION FIGS. 12092 AND 12093.

Construction.

1. Roller bushed, point thrust bearings.
2. Vertical wheels, chilled spherical tread.
3. Steel side frames and yoke.
4. Yoke swivels permitting easy hooking and unhooking of hoist.

Capacity.	Diameter of Wheels.	Wheel Base.	Distance Inside of Yoke to Under Side of Beam.	Standard I Beams Trolleys will Fit.
2,000.....	43 $\frac{1}{2}$ "	7"	3 $\frac{1}{2}$ "	6" x 12.25 lbs. to 9" x 21.0 lbs.
6,000.....	63 $\frac{1}{2}$ "	8 $\frac{3}{4}$ "	4 $\frac{1}{2}$ "	8" x 18.00 lbs. to 12" x 31.5 lbs.
10,000.....	83 $\frac{1}{2}$ "	11 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	10" x 25.00 lbs. to 15" x 42.0 lbs.
15,000.....	101 $\frac{1}{4}$ "	13"	6"	12" x 31.50 lbs. to 18" x 55.0 lbs.
20,000.....	113"	16"	7"	15" x 42.00 lbs. to 24" x 80.0 lbs.

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STEAM ENGINES.

CLASS A VERTICAL ENGINE.



FIG. 12094.

CLASS A VERTICAL ENGINE.
Combined with suitable boiler.

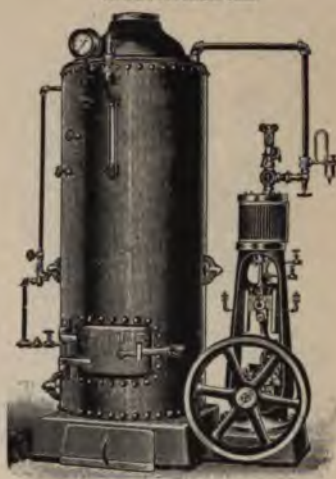


FIG. 12095.

DESCRIPTION FIGS. 12094 AND 12095.

Each engine is furnished with oil cups, sight feed lubricator, throttle valve and nipples, governor and governor belt.

The table of dimensions below applies to engines only, as shown in Fig. 12094. Any of the engines up to and including the 8" x 8" can be furnished combined with a suitable size boiler as shown in Fig. 12095.

As will be noticed, the engine and boiler bases are cast together, and the combined weight of the boiler and the water therein contained is sufficient to hold engine rigidly to its place while performing its service up to the given capacity. This renders foundation bolts for the engine unnecessary.

The complete outfit, as shown, includes the complete engine fixtures, all necessary boiler fixtures, with injector fitted and connections made between engine and boiler.

Exhaust pipe and stack will be furnished when so desired at an extra cost.

SPECIFICATIONS.

Horse-power as usually rated.	1½	3	5	7	10	14	20	25	35	50	75
Size of cylinder.....	3" x 3"	4" x 4"	5" x 5"	6" x 6"	7" x 7"	8" x 8"	9" x 9"	10" x 10"	12" x 12"	14" x 14"	16" x 16"
Revolutions per minute.....	300	250	250	200	190	180	160	160	160	150	140
Size of steam pipe.....	¾"	¾"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"
Size of exhaust pipe.....	¾"	1"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	4½"
Diameter of shaft.....	1½"	1½"	1½"	1½"	2½"	2½"	3½"	3½"	4½"	4½"	5½"
Diameter of fly wheel.....	12"	16"	20"	24"	32"	36"	42"	44"	48"	52"	54"
Face of fly wheel.....	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"
Height from floor to center of shaft.....	9"	9½"	12"	14"	17½"	18"	23½"	26¼"	27½"	30"	32"
Height from floor to top of cylinder.....	31"	36½"	43"	54"	61"	68"			94"	105"	113"
Floor space required, sq. in.....	12½	13½	15	18	24					41	41
Weight of engine.....	225 lbs.	350 lbs.	425 lbs.	700 lbs.	1,150 lbs.					7,100 lbs.	7,500 lbs.

STEAM ENGINES.

CLASS B VERTICAL ENGINE.



FIG. 12096.

CLASS B VERTICAL ENGINE.

Combined with Suitable Boiler.



FIG. 12097.

DESCRIPTION FIGS. 12096 AND 12097.

Each engine is furnished complete with oil cups, sight feed lubricator, throttle valve and nipples, governor and governor belt.

The table of specifications below applies to engines only, as shown in Fig. 12096.

Any engine up to and including the 7" x 7" size can be combined with a suitable boiler. In this case both engine and boiler are mounted on a common base (see Fig. 12097), making a very substantial, self-contained rig. Boilers are of ample capacity to give best results with those engines to which they are attached.

SPECIFICATIONS.

Horse-power as usually rated.....	1½	3	5	7	10	14	20
Size of cylinder.....	3" x 3"	4" x 4"	5" x 5"	6" x 6"	7" x 7"	8" x 8"	9" x 9"
Revolutions per minute.....	300	250	250	200	190	180	160
Size of steam pipe.....	½"	¾"	¾"	1"	1¼"	1½"	2"
Diameter of exhaust pipe.....	¾"	1"	1"	1¼"	1½"	2"	2½"
Diameter of shaft.....	1½"	1¾"	1¾"	1¾"	2½"	2¾"	2¾"
Diameter of fly wheel.....	12"	16"	20"	24"	32"	36"	42"
Face of fly wheel.....	3"	4"	5"	6"	7"	8"	9"
Height from floor to center of shaft.....	9"	10"	12"	14"	18"	20"	24"
Height to top of cylinder.....	2' 6"	3'	3' 7"	4' 5"	5' 1"	5' 8"	6' 7"
Floor space occupied.....	13" x 23"	15" x 28"	18" x 36"	22" x 40"	25" x 46"	29" x 50"	36" x 36"
Weight of engine.....	225 lbs.	425 lbs.	600 lbs.	1,000 lbs.	1,400 lbs.	2,050 lbs.	2,650 lbs.

STEAM ENGINES.

CLASS C VERTICAL ENGINE.



FIG. 12098.

CLASS C VERTICAL ENGINE.
Combined with Suitable Boiler.



FIG. 12099.

DESCRIPTION FIGS. 12098 AND 12099.

Each engine, as shown in Fig. 12098 is furnished complete with pulley, fly wheel, oil cups, sight feed lubricator, throttle valve and nipples, governor and governor belt.

The table of specifications below applies to engines alone as shown in Fig. 12098, but any engine can be combined with a boiler of suitable size as shown in Fig. 12099, making a very substantial, self-contained rig. Boilers furnished are of ample size to give the best results with the engines to which they are connected.

SPECIFICATIONS.

	1	2	4	6	8
Horse-power as usually rated.....	1	2	4	6	8
Size of cylinder.....	2½" x 3"	3" x 5"	4" x 5"	5" x 7½"	6" x 7½"
Revolutions per minute.....	400	350	325	250	225
Diameter of steam pipe.....	¾"	½"	¾"	1"	1½"
Diameter of exhaust pipe.....	½"	¾"	1"	1¼"	1½"
Diameter of shaft.....	1½"	1¾"	1¾"	2½"	2½"
Diameter and face of wheel.....	13" x 3½"	15" x 4"	17" x 4½"	24" x 6"	24" x 6"
Diameter and face of pulley.....	6" x 3"	10" x 5"	12" x 6"	14" x 7"	14" x 7"
Height from floor to center of shaft.....	7"	10"	10"	13"	13"
Height from floor to top of cylinder.....	28"	43"	43"	54"	54"
Floor space occupied, square inches.....	13	17	17	30	30
Approximate weight.....	200 lbs.	400 lbs.	450 lbs.		

STEAM ENGINES.

DESCRIPTION FIG. 12101.

The cut shows our class A horizontal engine cut up in sections for mountain transportation. The several parts are well secured by means of reamed holes and turned bolts. For shipment each piece is carefully numbered before crating, so there will be no trouble in putting the machine together at destination.

Each engine is furnished complete with pulley, fly wheel, oil cups, sight feed lubricator, throttle valve and nipples, governor and governor belt.

SPECIFICATIONS.			
	10	15	20
Horse-power as usually rated.....			
Size of cylinder.....	7" x 10"	8" x 10"	9" x 12"
Revolutions per minute.....	190	190	160
Size of steam pipe.....	1½"	2"	2"
Size of exhaust pipe.....	2"	2½"	2½"
Size of pulley.....	18" x 8"	20" x 10"	20" x 10"
Size of fly wheel.....	36" x 7"	40" x 8"	44" x 9"
Diameter of shaft.....	2⅝"	2⅝"	3¼"
Floor space required.....	21" x 69"	24" x 70"	26" x 78"
Weight of heaviest piece.....	304 lbs.	378 lbs.	432 lbs.
Weight of complete engine.....	1,700 lbs.	2,300 lbs.	2,900 lbs.

CLASS A CENTER-CRANK HORIZONTAL ENGINE.

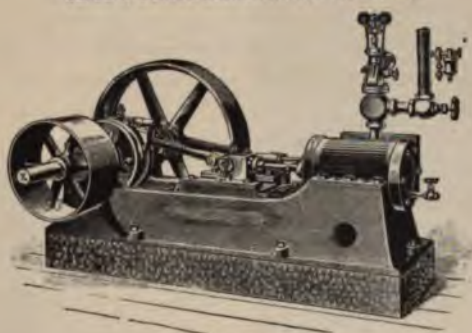


FIG. 12102.

DESCRIPTION FIG. 12102.

This engine is especially adapted for duty where two belts are desired. The band fly wheel is turned with crown face. Pump and heater can be attached to the 10, 15, 20, 25, 35, 50, and 60 horse-power of this pattern when so desired.

Each engine is regularly furnished complete with pulley, fly wheel, oil cups, sight-feed lubricator, throttle valve and nipples, governor and governor belt.

SPECIFICATIONS.								
	10	15	20	25	35	50	60	75
Horse-power as usually rated.....								
Size of cylinder.....	7" x 10"	8" x 10"	9" x 12"	10" x 12"	11" x 13"	12" x 15"	13" x 16"	14" x 18"
Revolutions per minute.....	190	190	160	160	100	150	150	150
Size of steam pipe.....	1½"	2"	2"	2½"	2½"	3"	3"	3½"
Size of exhaust pipe.....	2"	2½"	2½"	3"	3"	3½"	3½"	4"
Size of pulley.....	18" x 8"	20" x 10"	20" x 10"	24" x 12"	24" x 12"	30" x 14"	30" x 14"	36" x 16"
Size of fly wheel.....	36" x 7"	40" x 8"	44" x 9"	44" x 9"	48" x 10"	52" x 11"	60" x 14"	72" x 16"
Diameter of shaft.....	2⅝"	2⅝"	3¼"	3¼"	3¼"	4½"	4½"	5¼"
Length of journal.....	8½"	10"	10½"	11"	11"	12"	12"	13"
Width and length of bed plate.....	21" x 69"	24" x 76"	26" x 78"	28" x 91"	28" x 91"	30" x 102"	30" x 102"	34" x 116"
Weight of engine complete.....	1,900 lbs.	2,500 lbs.	3,000 lbs.	3,500 lbs.	4,300 lbs.	5,800 lbs.	7,000 lbs.	9,500 lbs.

STEAM ENGINES.

CLASS A DUPLEX VERTICAL ENGINE.

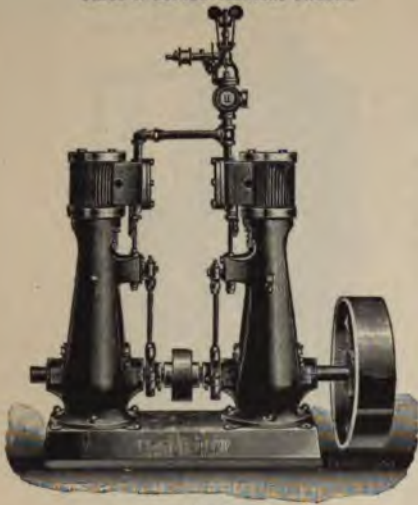


FIG. 12100.

DESCRIPTION FIG. 12100.

We present herewith a very desirable arrangement when variable service is required. The engines are coupled together with their cranks set at right angles so that it is impossible for the engine to stop on the "dead center."

Where the service of the engine requires frequent stopping and starting, this style of machine is appreciated by engineers.

Each engine is furnished with fly wheel, eight oil cups, sight feed lubricator, throttle valve and nipples, governor, governor belt and base.

SPECIFICATIONS.

Horse-power as usually rated.....	3	6	10	14	20	28	40	50	70	100	150
Size of cylinders.....	3" x 3"	4" x 4"	5" x 5"	6" x 6"	7" x 7"	8" x 8"	9" x 9"	10" x 10"	12" x 12"	14" x 14"	16" x 16"
Revolutions per minute.....	300	250	250	200	190	180	160	160	160	150	140
Size of steam pipe.....	1"	1 1/4"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"
Size of exhaust pipe.....	1 1/4"	1 1/2"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"
Size of fly wheel.....	12" x 3"	16" x 4"	20" x 5"	24" x 6"	32" x 7"	36" x 8"	42" x 9"	44" x 10"	48" x 12"	52" x 14"	54" x 16"
Height from floor to center of shaft.....	9"	9 1/2"	12"	14"	17 1/2"	20"	24"	26"	28"	30"	31 1/2"
Height to top of cylinder.....	31"	36 1/2"	43"	54"	61"	68"	76"	84"	92"	102"	112"
Diameter of shaft.....	1 3/8"	1 1/2"	1 5/8"	1 3/4"	2 1/8"	2 1/2"	2 3/4"	3 1/4"	3 3/4"	4 1/4"	5 1/4"
Floor space required.....	13" x 32"	14" x 35"	16" x 41"	18" x 49"	23" x 61"	26" x 65"	28" x 72"	32" x 75"	37" x 95"	40" x 110"	48" x 120"
Weight of engine.....	450 lbs.	600 lbs.	700 lbs.	1,200 lbs.	1,800 lbs.	2,800 lbs.	3,800 lbs.	5,000 lbs.	6,400 lbs.	8,000 lbs.	9,800 lbs.

CLASS A HORIZONTAL ENGINE. MADE SECTIONAL FOR MOUNTAIN TRANSPORTATION.



FIG. 12101.

For description see following page.

STEAM ENGINES.

DESCRIPTION FIG. 12101.

The cut shows our class A horizontal engine cut up in sections for mountain transportation. The several parts are well secured by means of reamed holes and turned bolts. For shipment each piece is carefully numbered before crating, so there will be no trouble in putting the machine together at destination.

Each engine is furnished complete with pulley, fly wheel, oil cups, sight feed lubricator, throttle valve and nipples, governor and governor belt.

SPECIFICATIONS.			
Horse-power as usually rated.....	10	15	20
Size of cylinder.....	7" x 10"	8" x 10"	9" x 12"
Revolutions per minute.....	190	190	160
Size of steam pipe.....	1½"	2"	2"
Size of exhaust pipe.....	2"	2½"	2½"
Size of pulley.....	18" x 8"	20" x 10"	20" x 10"
Size of fly wheel.....	36" x 7"	40" x 8"	44" x 9"
Diameter of shaft.....	2¾"	2¾"	3¼"
Floor space required.....	21" x 69"	24" x 76"	26" x 78"
Weight of heaviest piece.....	304 lbs.	378 lbs.	432 lbs.
Weight of complete engine.....	1,700 lbs.	2,300 lbs.	2,900 lbs.

CLASS A CENTER-CRANK HORIZONTAL ENGINE.

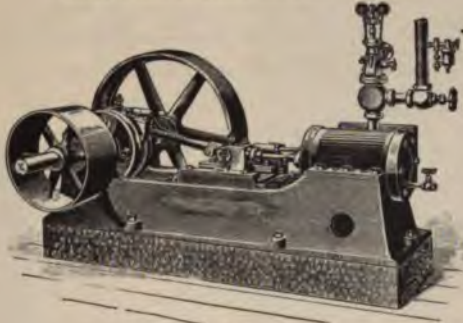


FIG. 12102.

DESCRIPTION FIG. 12102.

This engine is especially adapted for duty where two belts are desired. The band fly wheel is turned with crown face. Pump and heater can be attached to the 10, 15, 20, 25, 35, 50, and 60 horse-power of this pattern when so desired.

Each engine is regularly furnished complete with pulley, fly wheel, oil cups, sight-feed lubricator, throttle valve and nipples, governor and governor belt.

SPECIFICATIONS.								
Horse-power as usually rated.....	10	15	20	25	35	50	60	75
Size of cylinder.....	7" x 10"	8" x 10"	9" x 12"	10" x 12"	11" x 13"	12" x 15"	13" x 16"	14" x 18"
Revolutions per minute.....	190	190	160	160	160	150	150	150
Size of steam pipe.....	1½"	2"	2"	2½"	2½"	3"	3"	3½"
Size of exhaust pipe.....	2"	2½"	2½"	3"	3"	3½"	3½"	4"
Size of pulley.....	18" x 8"	20" x 10"	20" x 10"	24" x 12"	24" x 12"	30" x 14"	30" x 14"	36" x 16"
Size of fly wheel.....	36" x 7"	40" x 8"	44" x 9"	44" x 9"	48" x 10"	52" x 11"	60" x 14"	72" x 16"
Diameter of shaft.....	2¾"	2¾"	3¼"	3¼"	3¼"	4¼"	4¼"	5¼"
Length of journal.....	8½"	10"	10½"	11"	11"	12"	12"	13"
Width and length of bed plate.....	21" x 69"	24" x 76"	26" x 78"	28" x 91"	28" x 91"	30" x 102"	30" x 102"	34" x 116"
Weight of engine complete.....	1,900 lbs.	2,500 lbs.	3,000 lbs.	3,500 lbs.	4,300 lbs.	5,800 lbs.	7,000 lbs.	9,500 lbs.

STEAM ENGINES.

CLASS D HORIZONTAL ENGINE.



FIG. 12103.

DESCRIPTION FIG. 12103.

A glance at the outlines of this type will show rigidity, strength, beauty of design, and economy of floor space.

The metal is carefully distributed, so there is no useless weight. The sub-base shown can be dispensed with when so desired, and the engine mounted on a stone or concrete foundation.

The cylinder is cast separate from the frame, and is fastened by means of reamed holes and turned bolts. The piston is of the scraping class. The rings being turned larger than the bore of the cylinder, they will automatically expand and take up the wear, thereby obviating any leakage. The valve is of the "balanced" type, carefully fitted.

The crosshead is fitted with gun-metal taper gibs, so arranged that all lost motion may be easily taken up. The connecting rod is steel, fitted with phosphor-bronze bearings and an adjustable wedge at each end.

The crank shaft is of solid hammered steel, and counterbalanced with suitable cast-iron discs. The rods are all made of steel and the shaft bearings are poured with the best babbit.

A critical steam test is made of each engine and all adjustments carefully made before shipment, so that the engine is ready to run as soon as placed in position and given steam.

Each engine is regularly supplied with pulley fly wheel oil cups, sight feed lubricator throttle valve and nipples, governor, governor belt and sub-base.

Horse-power as usually rated.....	8	10	15	20	25
Size of cylinder.....	6" x 8"	7" x 9"	8" x 10"	9" x 11"	10" x 12"
Revolutions per minute.....	225	210	190	180	160
Size of steam pipe.....	1½"	1½"	2"	2"	2½"
Size of exhaust pipe.....	1½"	2"	2½"	2½"	3"
Size of pulley.....	14" x 7"	16" x 7½"	18" x 8"	20" x 10"	24" x 12"
Size of fly wheel.....	32" x 6"	36" x 7"	40" x 8"	44" x 9"	48" x 10"
Diameter of shaft.....	2½"	2¾"	3½"	3½"	3¾"
Length over all.....	68"	74"	86"	88½"	99½"
Width across crank.....	38"	44"	50"	54"	60"
Weight less sub-base.....	1,400 lbs.	2,200 lbs.	2,600 lbs.	3,300 lbs.	4,300 lbs.
Weight with sub-base.....	1,700 lbs.	2,600 lbs.	3,300 lbs.	4,200 lbs.	5,300 lbs.

DESCRIPTION FIG. 12104.

The great objection to plain slide-valve engines on the market to-day is that their strength has been sacrificed to either economy of material or beauty of design.

A simple glance at the engine here shown will convince anyone that we have combined strength and beauty. This design is so strong that it can be adapted to very high speed, heavy duty and continuous operation.

For isolated electric light plants, sawmills or mill work of any description, it is without a peer.

Equipped with arms heavy balance wheel, automatic stop governor and automatic oiling devices, it will run as steadily and smoothly as any automatic engine, yet owing to its simplicity does not require the attention of an experienced engineer.

Particular attention is called to the size of the several parts and the total weight of the engine.

For specifications see following page.

THE "B-H" HORIZONTAL ENGINE.

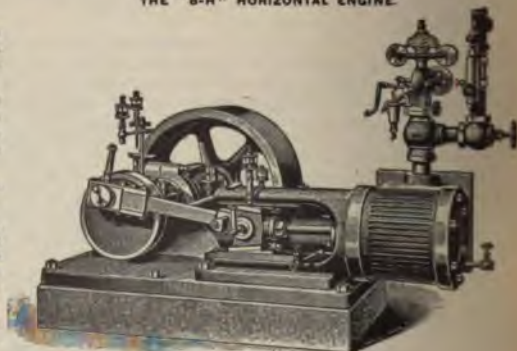


FIG. 12104.

STEAM ENGINES.

DESCRIPTION FIG. 12104.—Continued.

Each engine is furnished complete with fly wheel, wiping oil cups, sight feed lubricator, throttle valve and nipples, automatic stop governor, and governor belt.

Horse-power (based on tabular speed and 50 lbs. mean effective pressure).....	10	25	50	75
Size of cylinder.....	6" x 6"	8" x 8"	10" x 10"	12" x 12"
Diameter of steam pipe.....	1½"	2"	2½"	3"
Diameter of exhaust pipe.....	2"	2½"	3"	3½"
Revolutions per minute.....	350	300	265	235
Diameter and face of fly wheel.....	24" x 8"	32" x 11"	40" x 13"	48" x 16"
Weight of fly wheel.....	350 lbs.	800 lbs.	1,300 lbs.	1,800 lbs.
Diameter of crank shaft.....	2½"	3½"	4½"	4½"
Diameter of crank pin.....	2"	2½"	3½"	3½"
Diameter of piston rod.....	1½"	1½"	1½"	3"
Floor space occupied by base.....	30" x 40"	30" x 50"	40" x 62"	44" x 74"
Weight of complete engine.....	1,800 lbs.	3,000 lbs.	4,400 lbs.	6,700 lbs.

SPECIFICATIONS FIG. 12105.

Size number of engine.....	36	27
Horse-power as usually rated.....	10	15
Size of cylinder.....	7" x 7"	9" x 8"
Diameter of drum.....	20"	20"
Diameter of flanges.....	26"	26"
Length of drum.....	12"	12"
Diameter of gear wheel.....	32½"	32½"
Diameter of pinion.....	8"	8"
Diameter and face of fly wheel.....	32" x 21½"	32" x 21½"
Estimated lifting capacity at the rate of 200' per minute.....	1,200 lbs.	1,800 lbs.
Floor space required.....	30" x 45"	30" x 45"
Weight of engine.....	3,400 lbs.	3,600 lbs.

VERTICAL HOISTING ENGINE.



FIG. 12106.

DESCRIPTION FIG. 12106.

Size number of engine.....	6
Horse-power as usually rated.....	10
Size of cylinder.....	6" x 6"
Diameter of drum.....	8"
Diameter of flanges.....	30"
Length of drum between flanges.....	16"
Diameter of gear wheel.....	35"
Diameter of pinion.....	6"
Diameter of shaft.....	3"
Size of boiler.....	30" x 73"
Number of 2" tubes.....	65
Floor space required.....	48" x 58"
Suitable weight for pile-driving hammer.....	1,500 lbs.
Approximate shipping weight.....	4,800 lbs.

CONTRACTORS' HOISTING ENGINE.

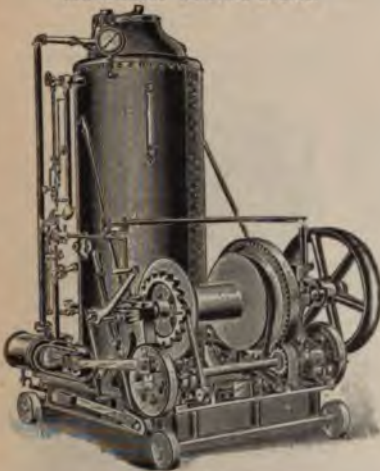


FIG. 12108.

The drum is fitted with our standard "Wern" friction hoist and can be used as a regular friction hoist for pile driving, etc.

The drum shaft is fitted with a large sheave and the engines are made reversible, for the purpose of running material elevators when so desired. This sheave is capable of being thrown out by means of a clutch arrangement, when the engine is needed for other hoisting, and re-rigging is thereby avoided.

The engine is equipped with suitable foot brakes, and all the working levers are within easy reach of the operator at one position.

STEAM ENGINES.

**SINGLE CYLINDER, FRICTION DRUM,
HORIZONTAL HOISTING ENGINE.**

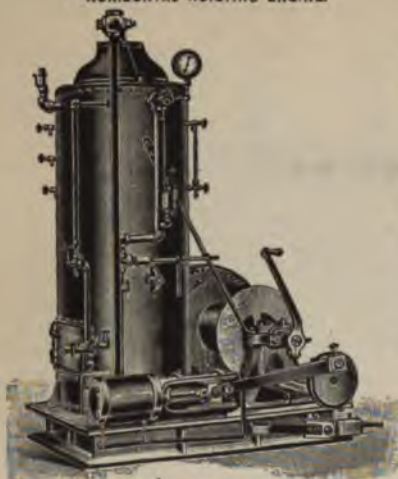


FIG. 12107

DESCRIPTION FIG. 12107.

Specially adapted for pile driving, railroads, contractors, and yards, docks, ships, quarries, and general hoisting purposes.

SPECIFICATIONS.

Size number of engine.....	1½	2	2½
Horse-power as usually rated ...	5	8	12
Size of cylinder.....	5" x 7"	6½" x 8"	7" x 10"
Diameter of drum.....	10"	11"	14"
Diameter of flanges.....	22"	23"	28"
Length of drum.....	16"	19"	24"
Diameter of gear wheel.....	25"	26½"	32½"
Diameter of pinion.....	6"	6½"	8"
Diameter and face of band wheel	20" x 5"	20" x 5"	28" x 7"
Size of boiler.....	27" x 60"	30" x 72"	30" x 72"
Number 2" tubes.....	30	42	46
Floor space required.....	35" x 58"	40" x 66"	48" x 70"
Weight of suitable pile-driving hammer.....	800 lbs.	1,200 lbs.	2,000 lbs.
Approximate weight.....	3,600 lbs.	4,400 lbs.	6,500 lbs.

**DOUBLE CYLINDER, DOUBLE FRICTION DRUM
HOISTING ENGINE.**



FIG. 12108.

**DOUBLE CYLINDER, SINGLE FRICTION DRUM
HOISTING ENGINE.**



FIG. 12109.

For specifications of Figs. 12108 and 12109 see following page.

STEAM ENGINES.

SPECIFICATIONS FIG. 12108.

Size number of engine.....	70	70½	71
Horse-power as usually rated.....	10	15	25
Size of cylinder.....	5" x 7"	6½" x 8"	7" x 10"
Diameter of drums.....	12"	14"	14"
Diameter of flanges.....	22"	26"	30"
Length of drums between flanges.....	20"	25"	32"
Size of boiler.....	30" x 72"	36" x 84"	42" x 84"
Number of 2" tubes.....	55	60	84
Floor space required.....	42" x 78"	48" x 88"	60" x 108"
Weight hoisted, single rope, usual speed.....	1,500 lbs.	2,500 lbs.	3,500 lbs.
Approximate shipping weight.....	6,800 lbs.	7,500 lbs.	11,000 lbs.

SPECIFICATIONS FIG. 12109.

Size number of engine.....	7½	8	9
Horse-power as usually rated.....	10	15	25
Size of cylinder.....	5" x 7"	6½" x 8"	7" x 10"
Diameter of drum.....	12"	14"	14"
Diameter of flanges.....	22"	26"	30"
Length of drum between flanges.....	20"	25"	32"
Diameter of gear wheel.....	25"	26½"	32½"
Diameter of pinion.....	6"	6½"	8"
Size of boiler.....	30" x 72"	36" x 84"	42" x 84"
Number of 2" tubes.....	55	60	84
Floor space required.....	42" x 60"	48" x 70"	60" x 81"
Suitable weight for pile-driving hammer.....	1,500 lbs.	2,000 lbs.	3,500 lbs.
Approximate shipping weight.....	4,400 lbs.	6,500 lbs.	10,000 lbs.

SPECIFICATIONS FIG. 12110.

Size number of engine.....	270	270½	271
Horse-power as usually rated.....	10	15	25
Size of cylinders.....	5" x 7"	6½" x 8"	7" x 10"
Diameter of drums.....	12"	14"	14"
Diameter of flanges.....	22"	26"	30"
Length of drum between flanges.....	16"	20"	25"
Size of boiler.....	30" x 72"	36" x 84"	42" x 84"
Number of 2" tubes.....	55	60	84
Floor space required.....	42" x 78"	48" x 78"	60" x 104"
Weight hoisted, single rope, usual speed.....	1,500 lbs.	2,000 lbs.	3,500 lbs.
Approximate shipping weight.....	6,900 lbs.	7,400 lbs.	11,500 lbs.

SPECIFICATIONS FIG. 12111.

Size number of engine.....	170½	171
Horse-power as usually rated.....	15	25
Size of cylinder.....	6½" x 8"	7" x 10"
Diameter of drums.....	14"	14"
Diameter of flanges.....	26"	30"
Length of drums.....	25"	32"
Diameter of derrick drums.....	10"	12"
Diameter of derrick drum flanges.....	18"	19"
Length of derrick drums.....	12"	15"
Size of boiler.....	36" x 84"	42" x 84"
Number 2" tubes.....	60	84
Floor space required.....	48" x 113"	60" x 135"
Weight hoisted, usual speed.....	2,500 lbs.	3,500 lbs.
Approximate shipping weight.....	9,000 lbs.	13,000 lbs.

DOUBLE CYLINDER, DOUBLE FRICTION DRUM HOISTING ENGINE WITH REVERSIBLE LINK MOTION.



FIG. 12110.

STEAM ENGINES.

DERRICK ENGINE, DOUBLE CYLINDER,
DOUBLE FRICTION DRUMS AND
DERRICK DRUMS.

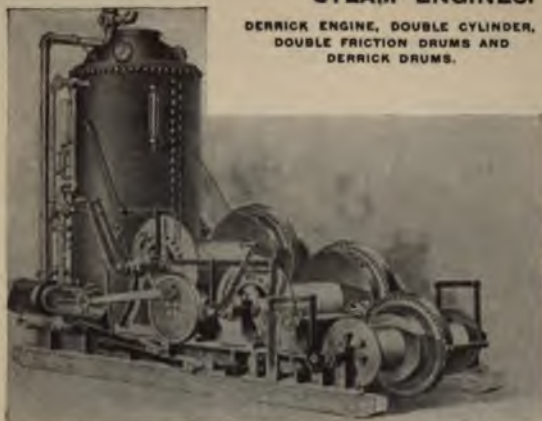


FIG. 1211.

Description on preceding page.

VERTICAL TUBULAR BOILER WITH
OCTAGON BASE.



FIG. 1212.

Each boiler is furnished with base (either octagon as shown or round), grates, hood, safety valve, steam gauge, water gauge, gauge cocks, blow-off valve, check valve and stop cock.

When ordering, please specify style of base desired.

SPECIFICATIONS.

Number of size.....	O	A	B	1	2	3	3½	4	5	6	7
Horse-power as usually rated	1½	2	3	4	5	6	6	7	9	11	12
Diameter of boiler.....	20"	20"	20"	24"	24"	24"	27"	27"	30"	30"	30"
Height of boiler.....	3'	3½'	4'	4'	5'	5'	5'	5'	6'	7'	7'
Diameter of furnace.....	16"	16"	16"	19"	19"	19"	21"	21"	24"	24"	26"
Height of furnace.....	18"	18"	18"	23"	23"	23"	26"	26"	26"	26"	26"
Thickness of shell.....	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"
Thickness of heads.....	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"	¾"
Thickness of furnace plate.....	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2
Number of tubes (all 2" in diameter).....	16	19	19	24	24	24	30	42	42	42	60
Length of tubes.....	18"	24"	30"	25"	37"	49"	34"	34"	46"	58"	46"
Square feet of heating surface	18	25	30	39	51	63	59	75	96	107	134
Weight of boiler without fixtures, about.....	350 lbs.	450 lbs.	550 lbs.	900 lbs.	1,000 lbs.	1,100 lbs.	1,100 lbs.	1,200 lbs.	1,400 lbs.	1,600 lbs.	1,700 lbs.
Weight of boiler with fixtures	450 lbs.	550 lbs.	650 lbs.	1,300 lbs.	1,400 lbs.	1,500 lbs.	1,500 lbs.	1,800 lbs.	2,000 lbs.	2,200 lbs.	2,300 lbs.

Number of size.....	8	9	10	11	12	13	14	15	16	*16½	*17
Horse-power as usually rated	14	16	20	23	27	30	35	40	50	60	75
Diameter of boiler.....	36"	36"	42"	42"	42"	48"	48"	48"	48"	54"	54"
Height of boiler.....	7'	8'	7'	8'	9'	8'	9'	10'	10'	10'	12'
Diameter of furnace.....	30"	30"	36"	36"	36"	42"	42"	42"	42"	48"	48"
Height of furnace.....	29"	26"	30"	30"	30"	30"	30"	30"	30"	30"	30"
Thickness of shell.....	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"
Thickness of heads.....	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"	1½"
Thickness of furnace plate.....	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2
Number of tubes (all 2" in diameter).....	60	60	84	84	84	120	120	120	150	180	180
Length of tubes.....	58"	70"	54"	66"	78"	66"	78"	90"	90"	90"	114"
Square feet of heating surface	164	194	219	261	303	363	423	483	600	713	803
Weight of boiler without fixtures, about.....	2,100 lbs.	2,500 lbs.	2,800 lbs.	3,200 lbs.	3,600 lbs.	4,000 lbs.	4,500 lbs.	5,000 lbs.	5,600 lbs.	6,500 lbs.	7,800 lbs.
Weight of boiler with fixtures	2,700 lbs.	3,100 lbs.	3,700 lbs.	4,100 lbs.	4,500 lbs.	5,400 lbs.	5,900 lbs.	6,400 lbs.	7,000 lbs.	8,000 lbs.	9,500 lbs.

* Boilers Nos. 16½ and 17 have wrought-iron hoods, No. 10 iron. Bases are cast iron plates to set on brick walls.

BOILERS.

WATER FRONT, OPEN BOTTOM LOCOMOTIVE BOILER.

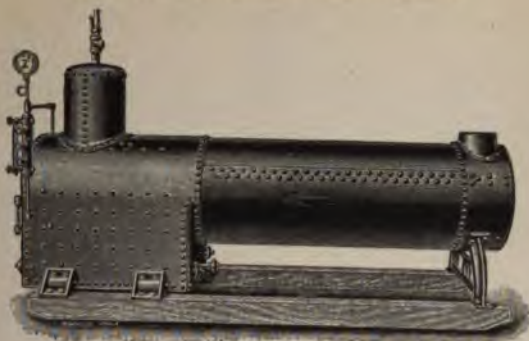


FIG. 12113.

DESCRIPTION FIG. 12113.

Each boiler is furnished with grates, water column attached with cocks, water gauge, steam gauge, safety valve, check and stop valve, whistle and blow-off valve.

SPECIFICATIONS.

Number of size.....	3	4	5	6	7	8	9	10	11	12
Horse-power as usually rated.....	10	12	15	20	25	30	35	40	50	60
Diameter of boiler.....	32"	32"	32"	34"	36"	36"	40"	40"	42"	48"
Length of fire box.....	38"	38"	44"	52"	52"	52"	52"	54"	54"	64"
Height of fire box.....	33"	33"	33"	36"	38"	40"	42"	40"	42"	52"
Width of fire box.....	26"	26"	26"	28"	30"	30"	34"	36"	42"	42"
Number of 3" tubes.....	26	26	26	28	34	34	40	43	56	56
Length of tubes.....	66"	72"	78"	90"	96"	120"	102"	120"	126"	144"
Thickness of shell.....	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	3/8"	3/8"	3/8"	3/8"
Thickness of furnace plates.....	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
Thickness of tube sheets and heads.....	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Size of dome.....	18" x 22"	18" x 22"	18" x 22"	20" x 24"	20" x 24"	20" x 24"	22" x 26"	22" x 26"	26" x 30"	26" x 30"
Diameter of stack.....	14"	14"	14"	16"	16"	16"	20"	20"	22"	22"
Length of stack.....	16"	18"	20"	25"	25"	25"	25"	25"	35"	35"
Weight of bare boiler on skids.....	3,125 lbs.	3,375 lbs.	3,625 lbs.	4,100 lbs.	4,650 lbs.	4,800 lbs.	6,200 lbs.	6,500 lbs.	8,000 lbs.	9,500 lbs.
Weight of boiler complete with fixtures.....	3,875 lbs.	4,125 lbs.	4,450 lbs.	5,100 lbs.	5,800 lbs.	6,000 lbs.	7,300 lbs.	8,000 lbs.	9,500 lbs.	11,000 lbs.

HORIZONTAL TUBULAR BOILERS.

SPECIFICATION FIGS. 12114 AND 12115.

Number of size.....	18	19	20	22	24	25	26	27	28	29	30	31	32	34
Horse-power as usually rated.....	10	12	15	20	25	30	35	40	45	50	60	70	80	100
Diameter of shell.....	30"	30"	30"	36"	42"	44"	44"	44"	48"	48"	54"	54"	60"	66"
Length of tubes.....	75"	81"	87"	105"	105"	105"	114"	114"	114"	114"	114"	114"	114"	114"
Diameter of tubes.....	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3 1/2"	4"	4"
Number of tubes.....	20	20	22	26	35	44	44	44	45	48	60	60	60	60
Diameter of dome.....	18"	18"	20"	22"	22"	22"	22"	22"	22"	22"	22"	22"	22"	22"
Height of dome.....	20"	20"	22"	24"	24"	24"	24"	24"	28"	28"	28"	28"	28"	28"
Thickness of shell.....	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Thickness of dome-plate.....	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Thickness of heads.....	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Square feet of heating surface.....	150	160	191	270	380	445	510	500	642	702	846	900	1,100	1,250
Length of grates.....	32"	32"	33 1/2"	41 1/2"	41 1/2"	47 1/2"	47 1/2"	52"	52"	52"	52"	52"	52"	52"
Width of grates.....	20"	20"	20"	20"	20"	20"	20"	20"	20"	20"	20"	20"	20"	20"
Diameter of stack.....	14"	14"	16"	16"	16"	16"	16"	16"	16"	16"	16"	16"	16"	16"
Length of stack.....	28"	28"	28"	35"	35"	35"	40"	40"	40"	40"	40"	40"	40"	40"
Weight of boiler and half-inch fixtures, lbs.....	1,600	1,900	2,000	2,000	4,100	4,000	5,100	5,600	6,800	7,300	8,700	9,300	11,100	14,000
Weight of boiler and half-inch fixtures, lbs., about.....	3,100	3,400	4,300	5,000	6,600	7,500	8,500	10,500	11,000	13,700	15,200	18,200	21,600	27,000

Each boiler is furnished with a complete set of fittings.

BOILERS.

STANDARD BOILER WITH HALF-ARCH FRONT SETTING.

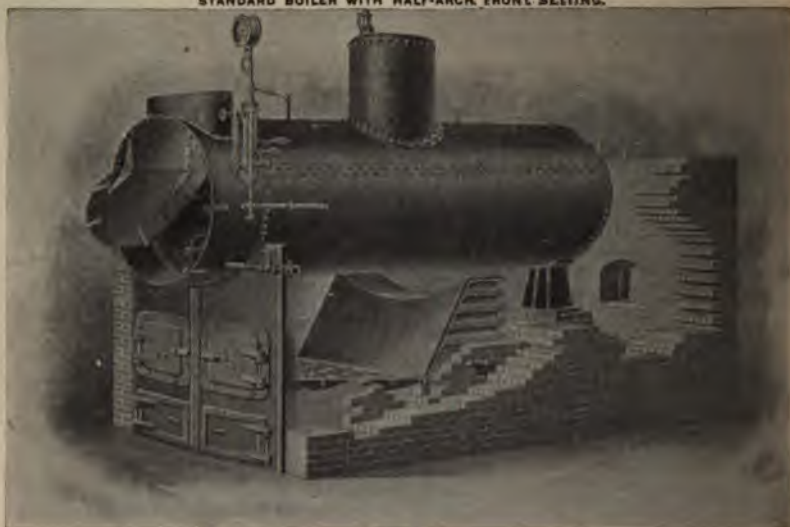


FIG. 12114.

For description see preceding page.

STANDARD BOILER WITH FULL-ARCH FRONT SETTING.

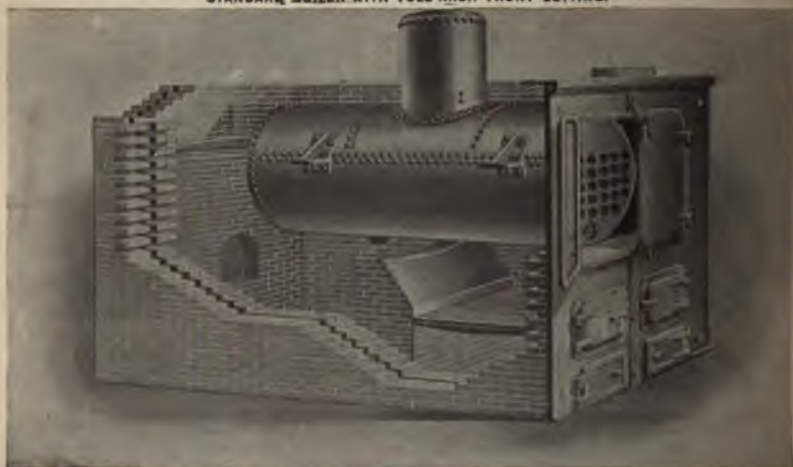


FIG. 12115.

For description see preceding page.

THE FAIRBANKS MITERING AND BEVELING SAW TABLE.



FIG. 12116.



FIG. 12117.

DESCRIPTION FIGS. 12116 TO 12119.

This machine will do any and all work that an ordinary stationary or movable table will do, and in addition will saw with perfect accuracy any angle, bevel or miter, or two angles at once. It can be changed quickly to any class of work coming within range of the saw. The saw can be raised and lowered perpendicularly by turning a hand wheel which readily adapts it for grooving or rabbeting. By turning the hand wheel on the front of the machine, the saw can be changed from perpendicular to any angle to 45°. The left-hand table is hinged at the back so it can be raised, and also has a movement sidewise, so it can be adjusted to the saw as may be desired. The right-hand table runs on well-fitted rolls so as to run true and easy. This also has a sidewise adjustment sufficient to allow the use of a dado head for rabbeting, in place of the saw. One of the gauges has a right and left movement, the same as in any splitting saw table, but in addition can be turned around either way to an angle to the saw and locked without interfering with the right and left movement.

For cutting picture frames or any work of that class, the attachment shown on the floor is used, which is adjustable to different angles. With this the saw cuts from the inside to the outside of the wood, thus leaving the corners full and smooth, whereas all other saws cut one end in the opposite or against the grain, which tears off the inside corner, leaving it rough.

This machine is accurate—all joints are cut perfect and need no finishing with a block plane to make glue joints.

Table is shipped complete without the saw which is furnished at extra cost only.

The left-hand table is 26" x 39"; the right hand 27" x 33". Floor space, 5' 8". It is complete in itself. Tight and loose pulleys on countershaft, 8" x 5" face, should run 850 revolutions per minute. Pulleys self-oiling.

Drive pulley to saw arbor, 10" diameter; saw arbor for 1" hole. Carries 12" saw, but will carry larger. Shipping weight, 1,000 lbs. It is light, yet strong and well proportioned. Belt furnished.

12 REASONS WHY IT IS THE MOST COMPLETE MACHINE OF ITS KIND IN EXISTENCE.

1. Simple in design and does not get out of order.
2. Sliding and lifting table permits getting at the working parts in the easiest possible manner.
3. Sliding table rolls on V-shaped track, thus insuring a perfectly parallel movement with the saw.
4. Saw can be set at any angle up to 45°. The man behind the saw knows that a tipping saw is better than a tipping table.
5. Saw can be raised and lowered perpendicularly when it is on an angle without changing the distance from the gauge.



FIG. 12118.

6. Saw is quickly adjusted for different kinds of work.

7. Tables can be adjusted sidewise as desired, so as to admit use of different thicknesses of dados.

8. Saw is so finely adjusted that it will saw a dove-tail with entrance no thicker than the saw blade.

9. A mitering gauge is attached to the sliding table and has a right and left mitering surface which can be changed to any angle.

10. In sawing a miter, the saw cuts from inside to outside, insuring good square edges.

11. Sliding table has two cutting-off gauges, one on front and the other on back edge, that can be used at the same time, one square and one on an angle, both square, or both on an angle. There is also a front and back sliding stopper for length gauges.

12. Saw is adapted to a great variety of work.



FIG. 12119.

OLIVER UNIVERSAL SAW BENCH.



FIG. 12120.



FIG. 12121.

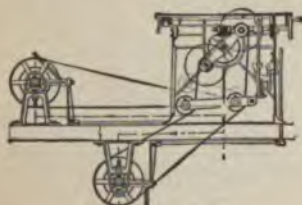


FIG. 12122.

DESCRIPTION FIGS. 12120 TO 12123.

Base.—Floor space, length, 40"; width, 30".
 Height to table, 32".
 Top.—Size, 36" x 44". Height from floor, 36".
 Sliding section, 16" wide, 44" long.
 Stationary section, 20" wide, 44" long.
 Extension to stationary section, 12" wide.
 Tilts to an angle of 45".
 Throat in table can be opened to 2".
 Saw Arbors.—Diameter, 1 1/4".
 Where saws are applied, 1" diameter.
 Yoke has side bearings, 6 1/2" diameter, 2" wide.
 Bearings, 5" and 4" long, 1 1/2" diameter.
 Pulleys, 4 1/2" diameter, 5 1/2" face.
 Speed of arbors, 2,770 revolutions per minute.
 A 14" saw will project above table 4".
 Countershaft.—Length, 42"; diameter, 1 1/2".
 Hangers, 14" drop.
 Bearings, 6" long, 1 1/2" diameter.
 Tight and loose pulleys, 10" diameter, 6" face.
 Driving pulley, 20" diameter, 5 1/2" face.
 Speed, 625 revolutions per minute.
 Floor space required, including countershaft on floor, 88" x
 48".
 Idler.—Pulleys, 6" x 6".
 Horse-power.—Five.
 Capacity.—Will rip to 20" wide.
 Will cut off to 36" wide.
 Using dado head will groove to 2" wide. This head is extra.
 Saws, 20" diameter maximum, 8" diameter minimum, can be
 Saws sent with machine, 14" diameter.
 Splitting fence admits of ripping 20" wide; swings to angle
 Universal gauges graduated from 15° to 165°.

Size.	Net Weight.	Crated Weight.	Base
48" x 40" x 45"	1,800 lbs.	1,900 lbs.	2,100
38" x 26" x 7"			
47" x 31" x 25"			

EXTRAS.

One endless leather belt to drive the saw arbor—16' long 2" for use with the countershaft in position shown in etching.

If for any reason the belt would be required different length price would be in proportion. We advise you to order this belt from us because we are having it made for this special purpose, durable, uniform, and made from pure oak tanned in

The main belt for driving the countershaft should be 5 1/2" This belt is guaranteed uniform and straight.

One special dado head and cutters, to work grooves from 2" wide.

Other styles and sizes of dado heads and grooving saws used on this machine, prices of which will be furnished when



FIG. 12123.

NO. 3 UNIVERSAL SAW TABLE.

FIGS. 12124 AND 12125.

The No. 3 Universal Saw Table has been to promote its kind in actual service, durability, design, workmanship. To this end no pains have been spared.

Tests that have been made confirm the fact that the machine is most liberal recommendation. The intending purchaser is invited to carefully compare the features of any other before order. Also to consider furnish (such as saws, etc.) without extra



FIG. 12124.

mandrels are mounted on a cast trunnion, and a saw may be placed on each of the two mandrels (preferably a rip saw on the one and a cut-off and either saw can be brought up into working position by simply turning the hand wheel at front of machine. The lower mandrel is so belted that only the upper saw is in motion when in use, the lower mandrel not being in contact with the belt and changing belts is required to change saws, simply turn the hand wheel, and the trunnion carrying both mandrels will raise the desired saw up through the table ready for operation; and this may readily be done while machine is running. The mandrel is made with a long stub, to admit a groover head 2" wide to be placed between tight collar and mandrel nut. The table is made with a short stub, admitting only a saw, made in this manner so that this mandrel may be raised to its maximum height to a full angle of 45°, without having end of mandrel strike against the under side of table. Both mandrels are of the table when table is level, or when but slightly inclined.

The mandrel may be 16" in diameter or smaller. With mandrel at maximum height a 12" saw will cut through stock 3" thick, or an 8" saw will cut a groove 1" deep. Grooves of any depth may be cut by turning the hand wheel to lower the mandrel to required point. The mandrel is cast in one piece and made heavy, insuring a rigid, well-behaved saw. The mandrel boxes are made with an oil cup and fitted with a capillary felt for continuous lubrication.

The table is cast in one piece, planed true, with wooden throat piece inserted. By turning a small hand wheel at side of machine the table may be tilted to any angle up to 45° for bevel sawing. A pointer and graduation are provided to indicate the desired angle. The table is of generous dimensions, having 22" to right side of saw and 14" to left side of saw, or total of 36" wide by 48" long.

The ripping gauge is tilting and reversible. It can be tilted to any angle to 45°, and can instantly be brought back to square again, a stop being provided for that purpose. It can be used on either side of the saw, and if placed on the right-hand side it will gauge stock up to 22" wide, a graduation on the slide showing width being ripped. If gauge is placed on left side of saw it will gauge stock up to 9" wide. The gauge can be entirely removed from the machine in an instant, leaving it clear for special work.

Two cut-off gauges are furnished, one right hand and one left hand. These are adjustable for square or angular work, and a graduation is provided on the table to set them to desired angle.

The belt shifter is operated by a small lever at front of machine near the floor, where it can be operated either with the hand or foot; it is so constructed that the belt cannot creep from one pulley to the other, but is automatically locked in whatever position placed.

The main frame is cast in one solid piece, sufficiently heavy to make it a smooth-running durable machine. The countershaft, with tight and loose pulleys, is mounted on rear of machine, making it entirely self-contained, ready for operation wherever set, and can be belted in any direction to line shaft. It is provided with a belt-tightening pulley, and liberal-sized belt surfaces, making it a powerful machine, suited for heavy as well as light work.

Regular Equipment.—The following items are included with each machine and need not be mentioned in ordering: One 12" rip saw; one 12" cut-off saw; ripping gauge; two cut-off gauges, and one 5" endless leather belt, of best quality, from countershaft to mandrels.

For specifications, see following page.



FIG. 12125.

NO. 3 UNIVERSAL SAW TABLE.

(Continued.)

SPECIFICATIONS FIGS. 12124 AND 12125.

Size of iron table.....	36" x 49"
Height of table from floor.....	34"
Size of mandrel hole for saws.....	1 1/4"
Diameter of mandrel pulleys.....	4 1/2"
Width of belt to mandrel.....	3"
Diameter of tight and loose pulleys.....	10"
Speed of tight and loose pulleys, revolutions per minute.....	640
Giving the saws a speed, revolutions per minute.....	3,000
Floor space required over all.....	49" x 79"
Cubic measure, boxed for export.....	60 cubic feet
Gross weight, boxed for export.....	1,750 lbs.
Net weight.....	1,400 lbs.

DOUBLE ARBOR RIP AND CUT-OFF SAW.



FIG. 12126.

DESCRIPTION FIG. 12126.

The illustration shows the iron frame machine arranged for ripping, with boring attachment.

The table is made of thoroughly seasoned and kiln-dried hard wood and is securely cleated. It is mounted on our anti-friction rollers and may be locked for ripping. A removable throat 5" wide, extending the whole length of the table, is provided to admit of using disk heads.

The arbors are not arranged as in other machines of this class. The revolving frame carrying them is journaled in a second frame, which is in turn supported by a shaft at the rear of the machine, and guided by a slotted iron bolted to the main frame in front. The weight of all these parts is evenly balanced by two coiled springs on the supporting shaft at the rear of the main frame. This arrangement is superior for the following reasons:

1. The working arbor is balanced direct from the countershaft at the rear of the machine, no idlers or tighteners being used.

2. The unused arbor is always at rest, the belt passing clear of the pulley on either side.

3. The raising and lowering movement is independent of the revolving movement. This enables us to provide in the self-acting spring catch which holds the revolving frame in position, a direct and positive support for the bearing next the saw. No other double arbor table on the market, so far as we are aware, has this feature.

The frame is either iron or wood, as may be preferred. The iron frame is heavy and cast in one piece. The wood frame is made of black birch or rock maple and is very rigid.

The boring attachment is entirely independent of the saw table. The arbor is fitted with a 1/2" hole, has a horizontal movement of 6" and is operated by either the foot or hand lever.

TABLE OF SIZES AND STYLES.

	Shipping Weight.	Speed of Counter.	T. and L. Pulleys.	Size of Table.	Table Travel.	Diameter of Arbor.	Hole in Saws.	Arbor Pulley.	Diameter of Base.
No. 1, iron frame.....	900 lbs.	710	9" x 4 1/4"	34" x 57"	23"	1 1/8"	1"	4" x 5"	14"
No. 1, wood frame.....	760 lbs.								
No. 3, iron frame.....	1,130 lbs.	610	11" x 5 1/2"	37" x 62"	27"	1 1/4"	4 1/2" x 6"	16"	
No. 3, wood frame.....	900 lbs.								
Boring attachment.....	250 lbs.			12" x 42"		1 1/8"		3 1/2" x 2 1/4"	

With each machine is included countershaft complete, rip saw, cut-off saw, arbor wrench, ripping gauge, cut-off gauge and miter gauge.

Boring attachment and self-centering chuck are extras and are furnished only when ordered, at additional cost.

TABLE EXTENSION FOR DOUBLE ARBOR RIP AND CUT-OFF SAW.



FIG. 12127.

DESCRIPTION FIG. 12127.

The saw table here shown is the same as that shown in Fig. 12126, except that it is furnished with an extension table, which may be 4', 6' or 8' long, as desired.

The table extension is framed together, trussed to prevent springing, and is provided with a steel lumber roll at the outer end. It is secured to the main table by two $\frac{3}{8}$ " steel taper pins, fitting accurately reamed holes in iron plates let into the table. It has our anti-friction rollers at the outer end, and in combination with the main table forms a thoroughly efficient carriage for cutting long material. When the work in hand requires its removal this can be easily effected as its weight alone holds it in place. A stop gauge is provided as shown in the illustration.

The standard supporting the outer end of the extension may be secured to the floor by a single bolt, as shown. By loosening the nut slightly the hook is released from the staple and the standard removed when desired.

NO. 1 DOUBLE COMBINATION SAW BENCH.

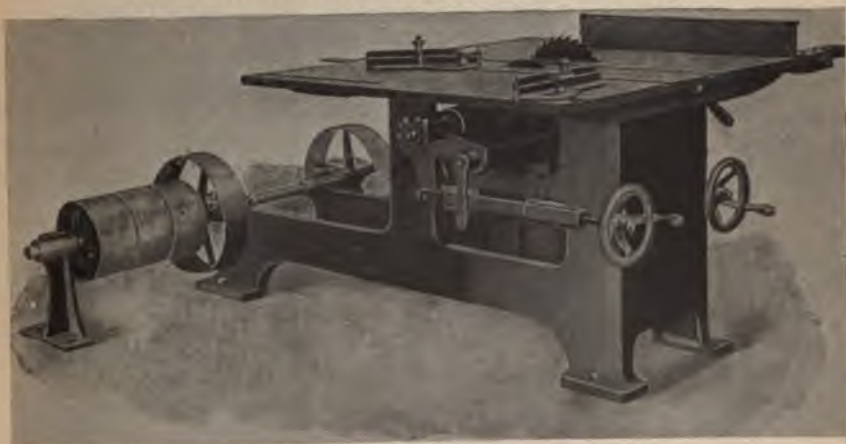


FIG. 12128.

DESCRIPTION FIG. 12128.

This engraving shows a new improved patented double saw bench for cutting off and ripping, arranged with two arbors for carrying a cut-off and a rip saw at the same time. The arbors are $1\frac{1}{4}$ " diameter and are driven and adjusted independently, and changing of arbors is very rapid. The table is of iron $54" \times 46"$ and is furnished with a bevel ripping gauge, two single miter gauges and one double miter gauge. All miter gauges have stop attachment for sawing to length and two extensions are supplied for wide crosscutting. The ripping arbor is extended to admit of dado head. This machine will rip $28"$ wide and crosscut $36"$ wide. Countershaft is attached to frame and pulleys are arranged to drive saws separately. Tight and loose pulleys are $10"$ diameter, $5"$ face and should make 550 revolutions per minute for $16"$ diameter saw. Weight, net, 1,400 lbs.; gross, 1,800 lbs.

Belts required: Two belts, each $11' 3"$ of $4"$.

Floor space: $5' 8"$ by $6' 6"$ long.

NO. 3 UNIVERSAL SAW TABLE.

(Continued.)

SPECIFICATIONS FIGS. 12124 AND 12125.

Size of iron table.....	36" x 48"
Height of table from floor.....	34"
Size of mandrel hole for saws.....	1 1/4"
Diameter of mandrel pulleys.....	4 1/4"
Width of belt to mandrel.....	5"
Width of belt to line shaft.....	5"
Diameter of tight and loose pulleys.....	10"
Speed of tight and loose pulleys, revolutions per minute.....	648
Giving the saws a speed, revolutions per minute.....	3,000
Floor space required over all.....	45" x 70"
Cubic measure, boxed for export.....	60 cubic feet
Gross weight, boxed for export.....	1,750 lbs.
Net weight.....	1,400 lbs.

DOUBLE ARBOR RIP AND CUT-OFF SAW.



FIG. 12126.

3. The raising and lowering movement is independent of the revolving movement. This enables us to provide in the self-acting spring catch which holds the revolving frame in position, a direct and positive support for the bearing next the saw. No other double arbor table on the market, so far as we are aware, has this feature.

The frame is either iron or wood, as may be preferred. The iron frame is heavy and cast in one piece. The wood frame is made of black birch or rock maple and is very rigid.

The boring attachment is entirely independent of the saw table. The arbor is fitted with a 3/2" hole, has a horizontal movement of 6" and is operated by either the foot or hand lever.

TABLE OF SIZES AND STYLES.

	Shipping Weight.	Speed of Counter.	T. and L. Pulleys.	Size of Table.	Table Travel.	Diameter of Arbor.	Hole in Saws.	Arbor Pulley.	Diameter of Saws.
No. 1, iron frame.....	900 lbs.	710	9" x 4 1/4"	34" x 57"	23"	1 1/8"	1"	4" x 5"	11"
No. 1, wood frame.....	760 lbs.								
No. 3, iron frame.....	1,130 lbs.	610	11" x 5 1/2"	37" x 62"	27"	1 1/4"	1 1/4"	4 1/2" x 6"	10"
No. 3, wood frame.....	900 lbs.								
Boring attachment.....	250 lbs.			13" x 42"		1 1/8"		3 1/2" x 3 1/4"	

With each machine is included countershaft complete, rip saw, cut-off saw, arbor wrench, ripping gauge, cut-off gauge and cross gauge.

Boring attachment and self-centering chuck are extras and are furnished only when ordered, at additional cost.

**TABLE EXTENSION FOR DOUBLE ARBOR
RIP AND CUT-OFF SAW.**



FIG. 12127.

DESCRIPTION FIG. 12127.

The saw table here shown is the same as that shown in Fig. 12125, except that it is furnished with an extension table, which may be 4', 6' or 8' long, as desired.

The table extension is framed together, braced to prevent springing, and is provided with a steel leader roll at the outer end. It is secured to the main table by two 1/2" steel taper pins, fitting accurately reamed holes in iron plates let into the table. It has two anti-friction rollers at the outer end, and in combination with the main table forms a thoroughly efficient machine for cutting long material. When the work in hand requires its removal this may be easily effected as the weight alone holds it in place. A stop-gang is provided as shown in the illustration.

The standard supporting the outer end of the extension may be secured to the floor by a single bolt, as shown. By loosening the nut slightly the hook is released from the staple and the standard moved when desired.

NO. 1 DOUBLE COMBINATION SAW BENCH.



FIG. 12128.

DESCRIPTION FIG. 12128.

This engraving shows a new improved patented double arbor bench for cutting off and ripping, arranged with two rollers. It is a cut-off and a rip saw at the same time. The rollers are 12" diameter and are driven and supported independently, mounted on rollers in very solid. The table is 4' 0" x 24" x 1 1/2" and is braced with a heavy ripping device. This device may be removed, leaving a ripping table in position to allow of table use. The machine will rip 24" and cut 24" wide. The rollers are supported by a frame and pulleys are arranged to direct saw movement. Light and heavy rollers are provided. The machine is made in two sizes, one per minute for 24" diameter saw. Weight of machine, gross, 1000 lbs. Bells required: Two bolts, each 3/4" x 4". Floor space: 1' 8" by 8' 6" long.

NO. 14 DOUBLE SAW BENCH.



FIG. 12129.

Machine.
Double saw bench.

Shipping
Weight.
1,300 lbs.

T. and L. Pulleys.
8" diameter, 4" face

Speed.
700

Power.
2 horse-power

Floor Space.
31 1/2' x 51'

DESCRIPTION FIG. 12129.

This is a strictly high-grade machine, adapted to pattern making, rabbet work, and all places where fine, accurate work is required.

The slitting gauge can be used at any angle from the vertical to 45°, and is adjustable to and from the saw by rack and pinion.

The portion of the table to the left of the saw slides in grooves, and the throat can be widened at will to make room for dado or grooving heads. A graduated section of circle is engraved on the table, to facilitate setting the guide. The top is also graduated left and right from the saw to facilitate the adjustment of the guides.

The saws are held on independent arbors, and these are journaled in a frame with circular bearings. Either saw may be brought up to the work by a few turns of the hand wheel. The saws may be adjusted to cut from nothing to their full capacity, and get the full belt power in whatever position they are set.

The driving shaft, with fast and loose pulleys, is attached to the machine, and from it both saws are driven with one belt. The endless belt from the driving shaft to the saw arbors is furnished with the machine. The adjustable hangers to the countershaft permit keeping this belt in proper tension.

The machine is shipped complete, with two saws, cut-off and splitting, and all needful guides and wrenches.

TIPPING TABLE SAW BENCH.



FIG. 12130.

DESCRIPTION FIG. 12130.

This machine is built from entirely new patterns, is very heavy and intended for the finest grade of work, such as slitting, crosscutting, mitering, bevel sawing, etc., and will carry saws up to 24" in diameter. The table is of iron, 3' wide by 4' long, planed perfectly true; and provided with slotted ways on either side of the saw for the crosscutting gauge; the table tilts for bevel sawing and can be firmly clamped at any angle between the level and 45°, an index serving to indicate the angle. The saw can be raised or lowered by means of a hand wheel convenient to operator. The arbor is 1 1/2" in diameter and extended so dado head can be used. Right and left hand miter, slitting gauge and necessary wrenches are furnished. Tight and loose pulleys are 10" diameter, 5" face and should make 600 revolutions per minute for 12" saw. Weight, 1,000 lbs.

COMBINATION SAW WITH TILTING TABLE.



FIG. 12131.

DESCRIPTION FIG. 12131.

The illustration shows all parts of the machine very clearly. It is of simple construction, substantially made, and is adapted for both ripping and crosscutting, also dado work. All adjustments are made at the front of the machine without the use of a wrench.

The table is of iron accurately surfaced and strongly braced. It is mounted on circular segments, as shown, may be set at any angle up to 45°, and is locked in position by the eccentric lever shown at the front of the machine. A removable wood throat is provided to admit of using dado heads.

The arbor is carried by a frame which slides on grooved ways as shown in the illustration. It is adjusted vertically by means of the screw and is locked in any desired position by the eccentric lever just above the screw crank. The arrangement provides a substantial support for the arbor, making it nearly as solid as if the boxes were bolted directly to the machine frame.

The frame is a heavy, one-piece casting. By making it in this way we obviate the danger of joints loosening and throwing the working parts of the machine out of alignment.

The ripping gauge slides on a steel rail at the front of the table and can be quickly removed. It may be used at the extreme edge of the table for ripping wide lumber.

Two cut-off gauges are furnished, fitting planed grooves on either side of the saw. They are adjustable to any angle up to 45°.

The countershaft is supported at the rear of the main frame as shown in the illustration. It is so located that the belt tension remains very nearly constant as the saw is raised or lowered.

SPECIFICATIONS.

Shipping Weight.	Speed of Counter.	T. and L. Pulleys.	Size of Table.	Diameter of Arbor.	Hole in Saw.	Arbor Pulley.	Diameter of Saw.
660 lbs.	815	9" x 4½"	31" x 41"	1½"	1"	4" x 4½"	14"

Each machine is furnished with rip saw, cut-off saw, arbor wrench, ripping gauge, and two miter cut-off gauges.

NO. 15 TIPPING TABLE SAW BENCH.



FIG. 12132.

DESCRIPTION FIG. 12132.

A simple, substantial machine, well proportioned and thoroughly well made throughout. The table is raised or lowered by the hand wheel working through gears and screws for changing depth of cut; and is tipped by hand rack and pinion to any angle desired to 45°.

The splitting guide can be used either side of the saw, and the cut-off guides can be used right or left, and set for sawing miters or any other angle. The table is also fitted for dado heads, or any tools requiring more space than saws.

Countershaft is fitted in the machine together with pulleys and belt shifter a 6" endless belt from the driving pulley on the countershaft to the saw arbor pulley, and a 12" saw are supplied with each machine. The countershaft

journal boxes are adjustable to take up the slack of the belt.

When desired, an adjustable boring table is fitted to the rear side of the machine, with chuck in end of arbor.

Machine is shipped complete with guides as shown, all necessary wrenches, saw arbor belt, and 12" saw.

SPECIFICATIONS

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Horse-Power.	Floor Space.
Tipping table saw.....	1,200 lbs.	8" diameter, 4" face	950	3	4' x 3'

NO. 27 COMBINATION SAW TABLE.

DESCRIPTION FIG. 12133.

This is a most handy saw table for any shop where there is light sawing and jobbing to be done. Splitting, cutting-off, grooving, beading, and any odd light work can be done upon it, the collars being grooved for receiving cutters for beading or similar work.

At the right of the table is a light boring table, adjustable with a drill holder in the end of the saw arbor.

The equipment of the machine is one right- and one left-hand sliding gauge which can be set to any angle, a plain low-slitting gauge for thin stock, one 8" slitting saw, belt from counter to arbor pulley, one twist drill, and needed wrenches.

This same machine is also fitted with treadle and balance wheel on a crank shaft for foot power, in place of the steam-power fixtures, when desired.

SPECIFICATIONS.

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Horse-Power.	Floor Space.
No. 27 saw.....	400 lbs.	6" diameter, 2½" face	725	1	2' x 3'



FIG. 12133.

M H A R H O D M H A R H O D M H A R H O D

NO. 3 SAW BENCH.

DESCRIPTION FIG. 12134.

This engraving represents a new iron frame saw bench. The arbor is of steel, and raises and lowers, and will carry saws up to 14" in diameter. The table is 2' 11" long by 2' 4" wide, and is provided with rip, a gauge and two crosscut mitre gauges. Counter-shaft is attached to frame, and is provided with slipper to receive belt from any direction. Tight and loose pulleys are 8" in diameter, 3" face and should make 750 revolutions per minute. Weight, 500 lbs.



FIG. 12134.

UNIVERSAL SAW BENCH.

DESCRIPTION FIG. 12135.

This machine is built from new patterns. It is adapted to a variety of work, such as slitting, crosscutting, mitering, etc. The saw can be raised or lowered by means of a hand wheel convenient to operator, and will carry saws up to 24" in diameter. The arbor is made with space for dado head. Arbor is 1 1/2" diameter. Table is 30" wide by 48" long. Right and left mitre gauges and slitting gauge are furnished. Counter-shaft has tight and loose pulley 9" in diameter and 4" face, and should make 750 revolutions per minute for 12" saw. Weight, 660 lbs.



FIG. 12135.

COMBINATION RIP AND CUT-OFF SAW.



FIG. 12136.

The boring attachment is entirely independent of the saw table and is driven by a separate pulley on the countershaft. The arbor is fitted with a $\frac{1}{2}$ " hole, and has a horizontal movement of 6".

SPECIFICATIONS.

	Shipping Weight.	Speed of Counter.	T. and L. Pulleys.	Size of Table.	Table Travel.	Diameter of Arbor.	Hole in Saw.	Arbor Pulley.	Diameter of Saw.
No. 1, iron frame.....	850 lbs.	710	9" x 4 $\frac{1}{4}$ "	34" x 57"	23"	1 $\frac{1}{2}$ "	1"	4" x 5"	14"
No. 1, wood frame.....	640 lbs.								
No. 3, iron frame.....	1,000 lbs.	610	11" x 5 $\frac{1}{2}$ "	37" x 62"	27"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	4 $\frac{1}{2}$ " x 6"	16"
No. 3, wood frame.....	770 lbs.								
Boring attachment.....	250 lbs.			13" x 42"		1 $\frac{1}{2}$ "		3 $\frac{1}{2}$ " x 3 $\frac{1}{4}$ "	

With each machine is included countershaft complete, rip saw, cut-off saw, arbor wrench, ripping gauge, cut-off gauge and miter gauge. Boring attachment and self-centering chuck are furnished only when ordered, at extra cost.

EXTENSION TABLE FOR COMBINATION SAWS.

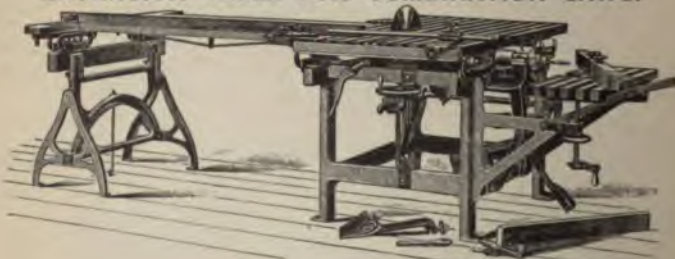


FIG. 12137.

DESCRIPTION FIG. 12137.

This machine is the same as that shown in Fig. 12136, but fitted with an extension table which may be either 4', 6', or 8' long. The table extension is supported at the outer end on our anti-friction rollers. By the use of steel taper pins on the extension which fit accurately reamed holes in iron plates let into the main table, a very rigid connection is formed and one which makes the removal of the extension easy when the work requires that this be done. The extension is framed together, trussed to prevent springing and has a steel lumber roll at the outer end. A stop gauge is provided as shown in the illustration. The standard supporting the outer end of the extension may be secured to the floor by a single bolt. By loosening the nut slightly the hook is released from the staple and the standard removed when desired.

NO. 4 VARIETY SAW.

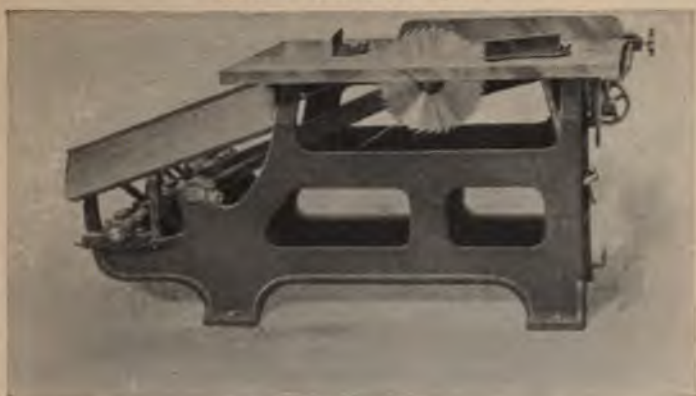


FIG. 12138.

DESCRIPTION FIG. 12138.

The saw mandrel is mounted on a swinging arm that is raised and lowered by means of hand-wheel and screw, to bring saw the required height through the work. This swinging arm is cast hollow (same style as band saw frame) to give utmost rigidity to mandrel. An endless belt is furnished and the countershaft is adjustable to take up any stretching that may occur in belt, by dispensing with a troublesome lacing. Takes saws up to 18" in diameter, 1" hole. A 12" saw will cut through stock 2½" thick. Will take grooves and 2" wide between tight collar and mandrel nut.

Number of tight and loose pulleys.....	5' x 10"
Speed of countershaft, revolutions per minute.....	800
Speed of table saw, revolutions per minute.....	3,000
Shipping weight, boxed for export.....	1,650 lbs.
Net weight.....	1,300 lbs.

MITER SAWING MACHINE.

DESCRIPTION FIG. 12139.

This machine is designed for cutting large or hard wood moldings. It is specially made for the machine, and is held and guided in such a manner that perfect joints can be sawed. It is made both for foot and steam power. It will cut all styles of moldings so they will join without planing—work is easy and light. The rule has a special gauge or stop which gives both the miter and rabbit measure without calculation; the molding rests have both vertical and perpendicular adjustments, giving the measure in the rabbit exactly where it should be.



FIG. 12139.

The saw has very little set and is ground concave. The clamps for holding the saw to file it without moving it from the arbor are a great convenience.

The table is equipped with eccentric handles for holding the molding, leaving both hands of the operator free to operate the sliding table top.

The steam fixtures are supplied in place of the treadle and balance wheel when desired.

Shipping weight, 450 lbs. Floor space, 24" x 30".

WOOD FRAME RIP SAWS.

DESCRIPTION FIG. 12140.

The cut represents our slitting saw tables, the dimensions of which are given below. These are made in the most thorough and workmanlike manner, from select, well-seasoned oak stock, with birch, maple or cherry tops glued-up from narrow strips.

The tops are all hinged at one end, and Nos. 1, 2 and 3 have a raising screw for elevating the top to accommodate the stock to be sawed.

Description continued on following page.



FIG. 12140.

WOOD FRAME RIP SAWS.

DESCRIPTION FIG. 12140.—Continued.

The cut shows the slitting gauge, which goes with each machine.

A grooved track will be let in on the top and a light cut-off attachment or rest will be added when ordered, for an extra charge.

No. 1.—Machine is 2' 10" wide by 3' 8" long; size of pulley, 4" diameter, $4\frac{1}{2}$ " face.

No. 2.—Machine is 3' wide by 4' long. The pulley is $4\frac{1}{2}$ " diameter, 5" face.

No. 3.—Machine is 3' 3" wide by 4' 6" long. The pulley is 5" diameter, 5" face.

No. 4.—Machine is 3' 6" wide by 5' long. The pulley is 6" diameter, $6\frac{1}{2}$ " face.

No. 5.—Machine is 3' 8" wide by 5' 6" long. The pulley is 7" diameter, 7" face.

No. 6.—Machine is 3' 10" wide by 6' long. The pulley is 8" diameter, 8" face.

Speed.—Run the periphery of the saw 9,000' per minute. Power required to drive above, 1 to 6 horse.

Saws for above machines, any diameter, gauge, or number of teeth, supplied at manufacturers' prices, when ordered, and charged extra.

IRON FRAME RIP SAW.

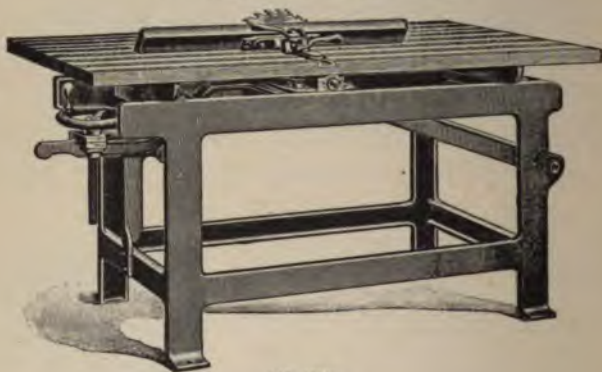


FIG. 12141.

DESCRIPTION FIG. 12141.

This tool is made to do one class of work and do it well. The arbor may be adjusted vertically to suit the work in hand and can be always used where it will be most efficient. The machine is strongly belted and is built for business.

The table is of our usual construction, made up of narrow pieces carefully jointed and glued together, and is fastened to heavy iron cleats bolted to the frame of the machine. A removable throat is provided to facilitate changing saws.

The arbor runs in connected, self-oiling boxes with the pulley between them. Oil chambers in connection with wicks supply oil to all parts of the journals. Any excess is collected by the chambers as it is forced out of the bearings. The yoke connecting the bearings is heavy and makes it impossible for them to get out of alignment. The cut shows the method of supporting the arbor yoke on a frame journaled at the rear of the machine, raised and lowered at the front by the hand wheel and screw, and securely fastened in any desired position by an eccentric lever at the left of the hand wheel.

The ripping gauge is our combination square and bevel gauge. It may be set at any angle up to 45° and is fastened in position by an eccentric lever.

The frame is cast in one piece and is heavily ribbed in all its parts.

The ripping gauge is our combination square and bevel gauge. It may be set at any angle up to 45° and is fastened in position by an eccentric lever.

Shipping Weight.	Speed of Counter.	T. and L. Pulleys.	Size of Table.	Diameter of Arbor.	Hole in Saw.	Arbor Pulley.	Diameter of Bar.
940 lbs.	680	11" x $5\frac{1}{2}$ "	38" x 63"	1 $\frac{1}{4}$ "	1 $\frac{1}{4}$ "	5" x 6"	16"

Each machine is furnished with countershaft complete, rip saw, arbor wrench, and ripping gauge.

DESCRIPTION FIG. 12142.

This engraving represents our No. 3 patent heavy hand-fed ripping saw, intended for either light or heavy ripping in hard or soft wood, taking a 24" saw at the largest, which will saw through material 10" thick and under. The fence can be adjusted from 0 to 26" from the saw for sawing lumber of different widths. It is especially intended for heavy ripping such as required in hard wood mills, car and railroad shops, wagon and agricultural implement works, where the principal sawing is in hard wood.

The frame, of neat design, is cast cored style, well braced and provided with a broad floor support.

The table is 36" x 72", of iron, cast in one piece, planed true and finished over the entire upper surface. In front of the saw it is fitted with a friction roller, with a vertical adjustment to prevent undue friction to the material on the table as the lumber is passing through the machine. The front end of the table is provided with hand wheel and cut gearing for raising and lowering the table. It can be lifted any desired height clear of the saw, giving free access to the mandrel for changing saws.

NO. 3 PATENT HEAVY HAND FEED RIPPING SAW.

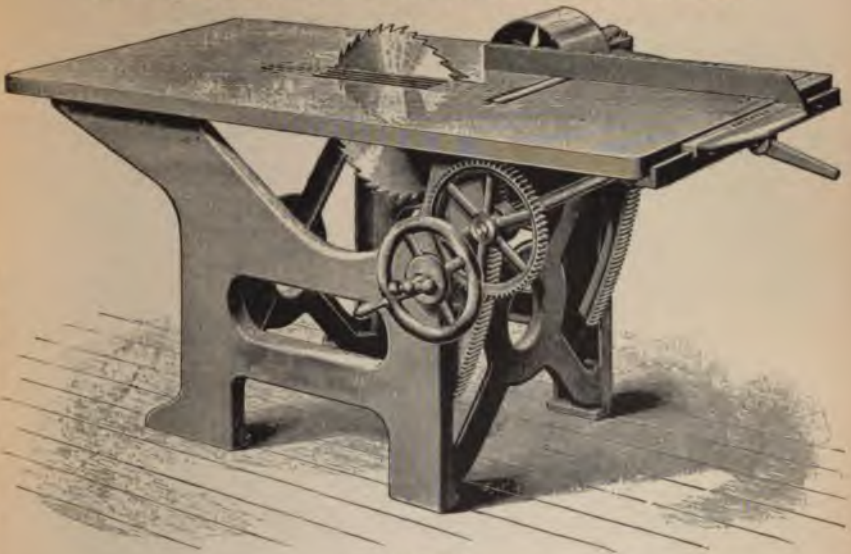


FIG. 12142.

Net Weight, 1,500 Lbs.

DESCRIPTION FIG. 12142.—Continued.

The saw arbor, of hammered steel, is $1\frac{1}{8}$ " diameter. The saw end is usually furnished to carry one saw, but it can be fitted, when so ordered, with an extended end and our new system of adjustable collars for carrying a gang of saws. In this case the table is cut out around the saw and filled in with adjustable steel bars to go between the saws for the support of the lumber. By this device the saws can be set from $\frac{1}{8}$ " up to 3" apart with any variations between these sizes, with the same collars, a convenient arrangement for cutting several strips at one time.

The arbor boxes are provided with three bearings, one outside the driving pulley to properly support the arbor to withstand heavy work. All the bearings are cast together forming a heavy yoke, which is independent of the main frame of the machine, and provided with adjustments to give more or less lead to the saw.

The patent fence can be instantly set to a scale in the table a desired distance from the saw, from 0" to 20", and it can be rigidly locked in position by a friction binder.

The counter is furnished as follows: Shaft, $2\frac{1}{8}$ " x 48"; two No. 2 ball-and-socket adjustable drop hangers; driving pulley, 30" x 8"; tight and loose pulleys, 14" x 8"; speed, 600 turns per minute; pulley on arbor, 10" x 8"; speed, 1,800 rotations per minute. Also a convenient rack and pinion adjustable belt shifter is furnished.

Horse power to drive, 4; floor space occupied, 58" x 72".

WOODEN FRAME BOX BOARD EDGING SAW.

DESCRIPTION FIG. 12143.

This pattern of machine has for many years been a favorite with the box trade, being preferred to iron frame machines. These frames are made of the best kiln dried old stock, carefully framed and thoroughly fastened. The tracks for the table are accurately planed, those on the left side being flat and those on the right side being V-shaped, insuring alignment, and being very light running.

The arbor is made of the best cast steel $1\frac{1}{2}$ " in diameter, and takes saws with 1" hole.

Shipping weight, 300 lbs.; pulley $4\frac{1}{2}$ " x 5"; speed, 3,000 revolutions per minute.

Countershaft, boxing, and saw, extra.

POWER FEED RIP SAWS.

WOOD FRAME BOX BOARD EDGING SAW.



FIG. 12143.

Description on preceding page

DESCRIPTION FIG. 12144.

A heavy, well-proportioned, durable machine, designed for ripping any kind of lumber, hard or soft wood.

The frame is cast in one piece, has three bearings for saw arbor, one of them an outside bearing beyond the driving pulley.

The table is iron, has a true surface, an opening around the saw into which an iron plate is accurately fitted to admit of changing the saws and to avoid raising the table, and is provided with adjustable idle rolls in front and rear of the saw and at the rear end of table. It is raised and lowered vertically on four cams, one at each corner of table, very quickly by means of a crank attached to a double threaded screw, and always maintains a parallel position.

The mandrel is of crucible steel, running in three long, self-oiling boxes, and is provided with sectional collars of different widths, so that two or more saws can be used at one time.

The feed works are positive and strong. The feeding spur runs in line with the saw to prevent marking the lumber, and is adjustable to and from the saw to give more or less lead to the board; a spreader is provided in the center of the outfeeding corrugated roll, and the entire works can be thrown upward and backward out of the way to allow the machine to be used as a hand fed rip saw.



FIG. 12144.

Shows No. 4 machine with feeding-out roll.

POWER FEED RIP SAWS.

DESCRIPTION FIG. 12144.—Continued.

The fence or gauge is entirely new and can be set to any fraction of an inch within its capacity for width, and is held firmly in position at any point by the slightest movement. An indicator in connection with a scale on front edge of table gives the width to be sawed.

	No. 3.	No. 4.	No. 4K.
Capacity, width and thickness.....	16" x 5"	16" x 5"	18" x 8½"
Diameter of mandrel.....	2"	2"	2½"
Rates of feed, per minute.....	55', 88' and 147'	55', 88' and 147'	80', 137' and 195'
Largest saw machine will carry.....	20"	20"	24"
Size of saw regularly furnished.....	18"	16"	18"
Pulley on arbor.....	7" x 7"	7" x 7"	8" x 8"
Speed of arbor, revolutions per minute.....	2,600	2,600	2,000
Tight and loose pulleys on countershaft.....	10" x 7"	10" x 7"	12" x 8"
Speed of countershaft, revolutions per minute.....	900	900	750
Weight, machine.....	1,350 lbs.	1,650 lbs.	2,300 lbs.
Weight, countershaft.....	200 lbs.	300 lbs.	300 lbs.

We furnish with each machine one rip saw, one feed spur, and necessary wrenches. Countershaft extra when desired.

We furnish for this machine when desired a bevel siding attachment.

NO. 3 DOUBLE CUT-OFF SAW.

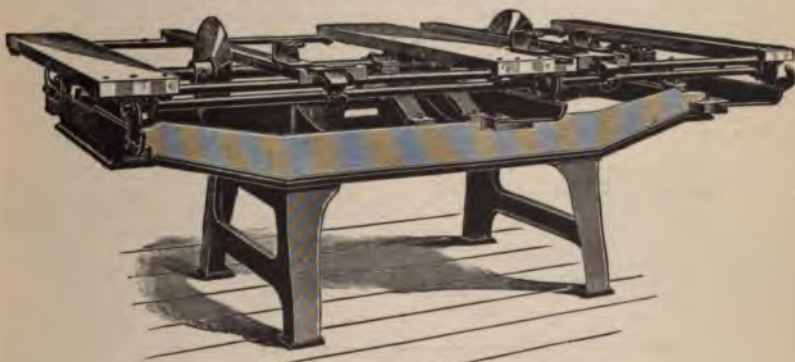


FIG. 12145.

DESCRIPTION FIG. 12145.

This is a thoroughly efficient tool of improved design. The following points should be carefully noted

The carriage is mounted on our anti-friction rollers, which are especially adapted for a machine of this kind. Without them it would be practically impossible to secure accuracy of movement, owing to the extreme dimensions of the machine. In order that perfect work may be done two things are essential in the carriage, viz.: it must be rigid, and must travel in a straight line absolutely square with the arbor. The necessary rigidity is secured by supporting it in the center as well as at the ends, and accuracy of movement is obtained by making the center tracks, both upper and lower, absolutely straight, securing them immovably in place, and relying on these alone to guide the carriage. All end rolls and tracks have flat surfaces and are used only for support. Lightness is secured by making the carriage in skeleton form, using drawn steel bars at the front and back connected by wood tables built up from narrow strips of thoroughly seasoned and kiln-dried hard wood. The sliding tables are each secured in any desired position by means of a single hand screw at the front of the machine.

NO. 3 DOUBLE CUT-OFF SAWS.

DESCRIPTION FIG. 12145.—Continued.

The arbor is made in one piece, with the driving pulley in the center between two bearings of liberal dimensions. The end bearings are mounted in such a manner that by loosening a single screw they may be moved away from the arbor to admit of removing saws and sleeves, and are so arranged that accurate alignment of the arbor is always preserved when they are in place.

The saws, which are concave ground, are carried on sleeves made in two parts, similar to the ordinary compression coupling. A single screw gives them a firm grip on the arbor. The saws are held in place by a combination collar and hexagon nut, for which a special wrench is furnished. Lengths from 6' to 16' are cut with both saws on either the right-hand or left-hand section of the arbor; for all remaining lengths the saws may be used one on each section of the arbor, as shown in the illustration.

The frame is very rigid and cast in one piece.

SPECIFICATIONS.

	Shipping Weight.	Carriage Travel.	Speed of Counter, R. T. M.	T. and L. Pulleys.	Distance Bet. Saws.	Diameter of Arbor.	Hole in Saws.	Arbor Pulley.	Diameter of Saws.
24" machine	1,450 lbs.	24"	680	11" x 5½"	8' to 80"	1¾"	2½"	5" x 6"	16"
30" machine	1,490 lbs.	30"							
36" machine	1,530 lbs.	36"							
48" machine	1,570 lbs.	48"							

Each machine is furnished with countershaft complete, two concave ground cut-off saws, three cut-off gauges, also two special sleeve wrenches.

WOODEN FRAME BOX BOARD CUT-OFF SAW.



FIG. 12146.

DESCRIPTION FIG. 12146.

The frames are made only of selected stock, and are thoroughly fastened.

The machine cuts both ends of the stuff at the same time, and is frequently supplied with extra sleeves to take additional saws. The arbor is made of the best cast steel 1¾" in diameter. The outer saw has a 1" hole, the inside saws have ¾" holes to fit the sleeves. The inside collar and the center rests are adjustable.

The pulley is at the left of the machine, 4½" x 5"; speed, 3,000 revolutions per minute; power required, 1 horse-power; shipping weight skidded, 350.

Countershaft, boxing and saw, extra.

SAW ARBORS.

STRAIGHT FRAME SAW ARBOR.

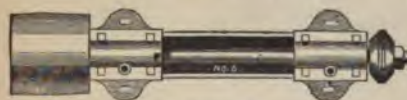


FIG. 12147.

YOKE FRAME SAW ARBOR.



FIG. 12148.

DESCRIPTION FIGS. 12147 AND 12148.

The accompanying cuts represent two patterns of saw arbors. These arbors are made of the best cast steel, with the best workmanship. The boxes are connected together by a strong web bed, and cannot get out of line. We use a self-oiling box, which is simple, very effective, easily cleaned when necessary, and lined with the best quality of babbitt metal. The bearings are long, and the caps planed to a shoulder fit. The journal next to the collar has several grooves in it, with corresponding rings in the box lining, which prevents all lateral or end motion, and keeps the saw always in its place. Every arbor is put under belt and thoroughly tested. The saw collars have cone bearings, permitting saws with different size of holes to be used.

SPECIFICATIONS.

No. of Arbors.	Size of Saws.	Distance from Center to Ear Flange.	Distance Between Pulley and Saw.	Diameter of Pulley.	Pole of Pulley.	Diameter of Collars.	Diameter of Arbors.	Holes in Saw.	Length of Bearings.
1	To 10"	14"	20"	4"	4½"	3"	1"	1½"	5"
2	14"	15½"	22"	4½"	5"	3½"	1½"	1½"	5½"
3	18"	16¾"	24"	5"	5"	4"	1½"	1½"	6"
4	24"	18½"	26"	6"	6½"	4½"	1½"	1½"	6½"
5	28"	19½"	28"	7"	7"	5"	1½"	1½"	7"
6	36"	21"	30"	8"	7"	5½"	1½"	1½"	7½"

SWING FRAME CUT-OFF SAWS.

DESCRIPTION FIG. 12149.

The accompanying cut represents a light but very strongly built swing cut-off saw. The frame swings on the hoists, thereby relieving the shaft from all strain. It is made of extra heavy wrought-iron tubing, connected by the wide cross girts in such a manner that it is impossible for it to spring or twist, as in the case of a great many machines.

The arbor frame is well proportioned and has self-oiling boxes. The mandrel and countershaft are of the best steel and the boxes lined with best babbit metal.

The saw is protected by a shield. Any size of saw up to 24" can be used.

The standard length of frame is 6', but the same can be furnished longer or shorter to suit requirements.

Tight and loose pulleys are 10" x 5 1/2", and should make 650 revolutions per minute for a 16" saw.

Driving pulley, 16" x 5 1/2".

Pulley on mandrel, 4 1/2" diameter by 5 1/2" face.

Size of hole required in saw, 1 1/2".

The machine is complete and can be set up and put in operation in a short time.

NO. 2 CUT-OFF SAW.



FIG. 12150.

NO. 1 IMPROVED CUT-OFF SAW.



FIG. 12149.

Furnished with or without adjustable counterbalance (shown in cut).

DESCRIPTION FIG. 12150.

This cut represents a new swing cutting-off saw. The frame is cast in one piece and is attached to the hangers and not to the shaft. This tool is very rigid and will not admit of any torsion, is equipped with counterbalances and guard for saw. Dimension, 6' 6" from foot of hanger to center of saw arbor. Tight and loose pulleys are 9" in diameter, 4" face, and should make 550 revolutions per minute for 16" saw. Saws extra.

Weight, 450 lbs.

SWING FRAME CUT-OFF SAWS.

PATENT HEAVY SWING SAW.

DESCRIPTION FIG. 12151.

This engraving represents our patent extra heavy swing cut-off saw, which is adapted to carry a saw from 24" up to 48" diameter. It is capable of cutting off heavy lumber or timber, and cutting round logs to lengths suitable for converting them into hub, spoke, wagon, stave, and hoop stock.

It is furnished with side brackets to be suspended from the side of a wall, as shown by the engraving, or with connected hangers to fasten to the ceiling, similar to our No. 1 machine, and it is built in seven different lengths, to measure 8', 9', 10', 11', 12', 13', and 14', from the center of the arbor to the top of the hanger.

The frame is cast in one piece with cored center, making it very stiff and reliable; and it is hinged to the hanger, which prevents end wear of the hinged bearings and lateral motion to the frame.

The saw arbor, of steel, is 1 1/2" diameter, running in self-oiling, genuine babbit metal bearings, and it is driven by an 8" belt; the saw is covered with a shield to protect the operator.

The patent spring balances used on this machine for the purpose of pulling the saw back from the operator, out of harm's way, command special attention; the weighted balances in common use are seriously objectionable, because of their great inertia and consequent resistance at both extremes of swing; it is to overcome this objection that we use the spring balances, and we find their qualities to be incomparable; the adjustments, by which a greater or less tendency backward can be secured, is another desirable feature.

This machine is so constructed that the operator is not obliged to lift a weight in pulling the saw forward, at the same time the saw is self-returning.

The roller table can be furnished to any length required; the rolls are fitted with finished steel spindles running in bored ball and socket boxes, and the lumber can be moved over the table with the greatest ease.

The counter is a portion of the machine, and it is furnished with belt-driving apparatus; the driving pulley is 24" diameter, 8" face; tight and loose pulleys are 14" diameter, 8" face; speed, 340 rotations per minute; pulley on arbor, 8" x 8"; speed, 1,000 revolutions for 36" saw. In ordering give length from top of hanger to center of saw arbor, also size of saw.

Horse-power to drive, 4.

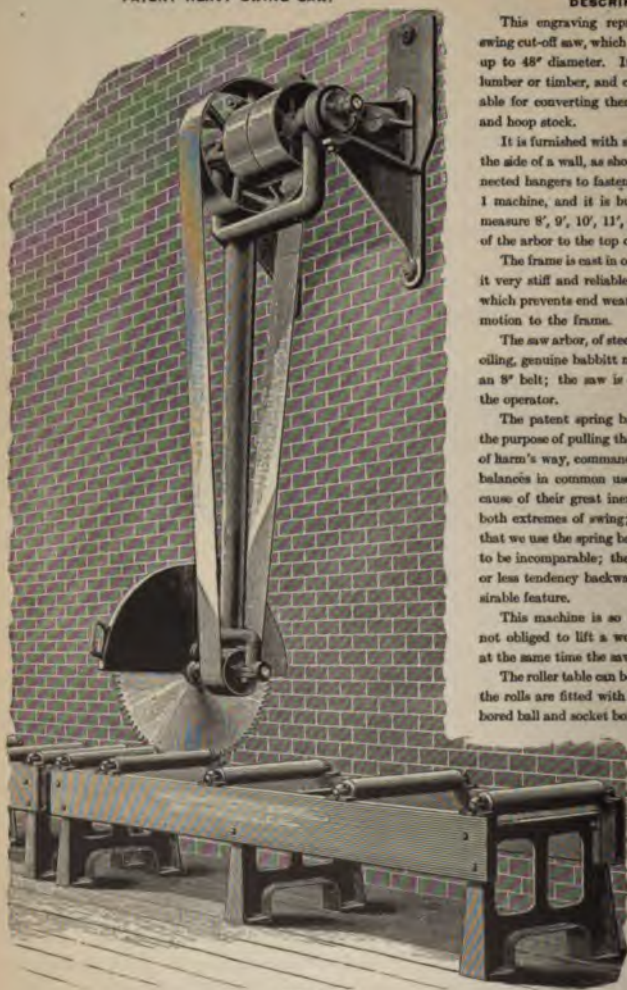


FIG. 12151.

Export shipping weight	3,100 lbs.
Net weight	1,900 lbs.
Cubic measurement	230.

BAND SAWS.

DESCRIPTION FIG. 12152.

The cut illustrates our latest improved 20' foot-power band saw
Entirely new design, sufficiently strong and rigid to withstand all demands
that may be made upon it.

Adapted to all kinds of work, such as is done on a power band saw, and is
invaluable to those not having power.

Frame is cast in one piece, and carries all the working parts. Legs are securely
bolted to same.

Shafts are all of steel, lathe-turned, and run in iron boxes lined with best bab-
bitt metal, and are 4" and 4 $\frac{1}{4}$ " long, accurately bored, and run very free.

The upper bearing for hand wheel, which slides on accurately planed gibbed
ways, is adjustable up and down by means of a hand wheel, so that saws can be
used until they are entirely worn out, and it also has adjustment to line it up
with lower saw pulley.

Gears are all automatic machine-cut, from solid iron.

Saw pulleys are 20" in diameter, turned, and covered with endless pure rubber
bands, strengthened with canvas, and will cut to center of a 40" circle.

Top guide is a roller guide wheel, and is made of hardened steel, to receive
throat of saw. Lower guide is hard wood and easily made when worn out.
Distance between table and upper guide, 7".

Table is made of kiln-dried hard wood, 22" x 22", and is 3' 4" from the floor.

Table is secured to iron cleat or segment underneath, and is arranged to tilt
for cutting on a bevel.

20' FOOT-POWER BAND SAW.



FIG. 12152.

20' FOOT-POWER SAW.



FIG. 12153.

DESCRIPTION FIG. 12153.

The range of work, and the rapidity with which it can be done on one of
these small machines, is a constant source of surprise and wonder to those
who are not familiar with them. They are suited to parties having light work
and light power, or light work and heavy power, or who have any kind of work
and no kind of power. In the construction the same care is exercised as in
our larger machines. Frames cast hollow, in one piece, and everything first
class throughout. It will be noticed that a crank is provided on gear wheel
for a second man to turn on, in addition to the double treadles. This is a
valuable feature in heavy work.

The machine has round steel guide bar. Tilting table. The table is of
wood, built up of veneers, re-enforced with an iron rib. Spring tension is not
necessary on this size machine, and is therefore not provided.

Regular equipment.—The following items are included with each machine,
and need not be mentioned in ordering: Two plain guides, one brazing clamp,
one brazing tong, one saw-blade set, filed and joined ready for use, $\frac{1}{4}$ " wide.
(Customers can, however, have choice of any width blade up to 1".)

For specifications, see following page.



BAND SAWS.

SPECIFICATIONS FIG. 12153.

Size of band wheels.....	20"
Distance between saw and frame.....	19"
Height under saw guide, when raised.....	7"
Size of table, wood.....	20" x 24"
Diameter of tight and loose pulleys.....	7"
Width of belt to use.....	3"
Speed, when used belt power.....	350 to 450
Length of saw blade.....	10' 1"

30" BAND SAW.



FIG. 12154.

Floor space required, over all.....	Belt Power. 20" x 34"	Foot Power. 24" x 40"	Foot and Belt 30" x 49"
Cubic measure, boxed for export.....	18'	18'	18'
Gross weight, boxed for export.....	440 lbs.	490 lbs.	515 lbs.
Net weight.....	275 lbs.	325 lbs.	350 lbs.

For general description, see preceding page.

DESCRIPTION FIG. 12154.

This machine is adapted to the smaller factories or planing mills, or to larger ones whose requirements do not demand machines of larger size. The machine is made up in a first-class manner throughout, is abundantly strong and rigid for any work coming within the range of this size machine, and since it can be provided with the foot-power equipments, adapts it to parties who do not have belt power accessible at all times, and yet desire to use a band saw most any time. This size machine will do any work coming within its range as rapidly and satisfactorily as the same work could be done on a larger machine. It has tilting table with stop, spring tension, hexagon steel guide bar (not counterbalanced).

Regular equipment.—The following articles are included with each machine, and need not be mentioned in ordering: One Wright's guide above table, one brazing clamp, one brazing tong, one saw blade set, filed and joined ready for use, 3½" wide. (Customers can, however, have choice of any width blade up to 1".) Iron table will be furnished unless wood table is specified in ordering.

SPECIFICATIONS.

Size of band wheels, face.....	26" x 1½"
Distance clear between saw and frame.....	25"
Height clear under guide when raised.....	8"
Size of table (iron or wood).....	20" x 24"
Diameter of tight and loose pulleys.....	10"
Width of belt to use.....	3"
Speed, revolutions per minute.....	350 to 450
Length of saw blade.....	13' 9"
Floor space required, over all.....	30" x 40"
Cubic measure, boxed for export.....	23'

	Belt Power.	Foot and Belt
Gross weight, boxed for export.....	680 lbs.	730 lbs.
Net weight.....	500 lbs.	550 lbs.

DESCRIPTION FIG. 12155.

This is a good-sized machine to select for factory or general planing mill use, where the work to be done is not of extremely large dimension, or where the amount of work would not justify the purchase of a more expensive machine. In rigidity and durability the machine is the equal of our 36" shown on following page, and like it, the frame is also cast entire in one piece, corse out hollow. This machine has already had a large sale, and proven very satisfactory for an all-round serviceable machine.

It has spring tension, tilting table with stop, hexagon steel guide bar, but spring counterbalance for guide bar is not furnished on this machine unless specially ordered at an additional cost. (Description continued on following page.)

32" BAND SAW.



FIG. 12155.

THE PATENT MACHINE COMPANY

BAND SAWS.

DESCRIPTION FIG. 12155.—Continued.

Regular equipment.—The following items are included with each machine, and need not be mentioned in ordering: One Wright's guide above table, one brazing clamp, one brazing tong, one saw blade set, filed and jointed ready for use, $1\frac{1}{2}$ " wide. (Customers can, however, have choice of any width blade up to 1")

SPECIFICATIONS.

Size of band wheels, face.....	32" x 13 $\frac{1}{4}$ "
Distance clear between saw and frame.....	31"
Height clear under guide, when raised.....	11"
Size of table (iron).....	24" x 28"
Diameter of tight and loose pulley.....	12"
Width of belt to use.....	3 $\frac{1}{2}$ "
Speed, revolutions per minute.....	350 to 450
Length of saw blade.....	18' 4"
Floor space required over all.....	35' x 48"
Cubic measure, boxed for export.....	34'
Gross weight, boxed for export.....	1,050 lbs.
Net weight.....	850 lbs.

DESCRIPTION FIG. 12156.

This is the standard size as used in factories and large planing mills, having ample capacity to accommodate any ordinary work; a machine that for completeness of detail, design and durability will stand comparison with anything now on the market. The guide bar is of steel, hexagon in shape, and is provided with a spring counterbalance for convenience in adjusting, and to prevent accident from falling when loosened. Is also provided with spring tension, tilting table with stop, front and rear fenders. The entire frame is cast in one piece cored out hollow, making it extremely rigid. This machine has recently been much improved, being now made with our latest improved tilting device for table, which works free and easy.

Regular equipment.—The following items are included with each machine, and need not be mentioned in ordering. One Wright's guide above table, one brazing clamp, one brazing tong, one saw blade set, filed and jointed ready for use, $\frac{3}{4}$ " wide.



FIG. 12156.

Extras.—Wood rim wheels and ripping gauge can be furnished, but will be charged for extra.

SPECIFICATIONS.

Size of band wheels, face.....	36" x 2"
Distance clear between saw and frame.....	36"
Height clear under guide, when raised.....	17"
Size of table (iron).....	28" x 32"
Diameter of tight and loose pulley.....	12"
Width of belt to use.....	4"
Speed, revolutions per minute.....	350 to 450
Length of saw blade.....	18' 6"
Floor space required over all.....	39' x 57"
Cubic measure, boxed for export.....	45'
Gross weight, boxed for export.....	1,300 lbs.
Net weight.....	1,100 lbs.

DESCRIPTION FIGS. 12157 AND 12158.

The advantage of a band saw on which the table is always level, but which admits of tilting the saw for bevel work, is at once apparent, since it is so much easier to handle the work on a level table than on an inclined one. On larger work it means the saving of an extra man helping to hold the work, while smaller work can be turned out more accurately and in less time. For common everyday square sawing there is not a single objectionable feature, as compared to the ordinary kind of band saw.



FIG. 12157.

BAND SAWS.

36° ANGLE BAND SAW, ERECT.

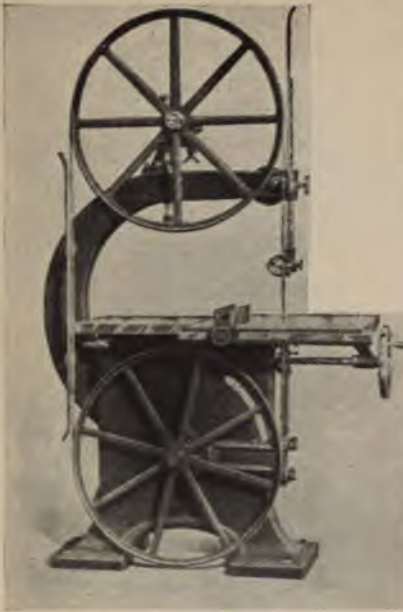


FIG. 12156.

same as on our regular band saws. This is much better than the loose pulley style used on most makes of band saws. The table slides on the planed ways of the pedestal, and is provided with a steel gib for taking up possible wear. The saw will tilt back to an angle of 45°, a stop being provided at that point. Also the saw may be tilted forward to 4° beyond the perpendicular. A stop is also provided on the perpendicular point so this point may easily be reached without referring to the graduated quadrant. But this stop can instantly be swung out of place allowing saw to pass on an out-tilt angle as mentioned. The machine has all the good features of our regular style of band saws, such as spring tension, counterbalanced guide bar, hollow cored-out frame, universal adjustments to upper wheel, etc.

The special features of this machine have been patented, and cannot be obtained in any other make of machine. Regular equipment.—The following items are included with each machine, and need not be mentioned in ordering: One pair brazing tongs, one brazing clamp, one Wright's guide above table, one saw blade, ready for use, 3/4" wide, or choice of any width up to 1". One ripping gauge. (An additional price will be charged if ordered with wood rim wheels.)

DESCRIPTION FIGS. 12157 AND 12158.—Continued.

We do not claim to have originated the idea of making a level-table band saw, with tilting saw, as a few such machines are already on the market. But we do claim to have worked out the idea in a new way that is thoroughly practical, and that ours is the first and only practical machine of the kind made. We take liberty of enumerating some of the imperfections of other makes of machines of this type, viz.: Counterbalanced mechanisms are used that are liable to get out of order. Throat blocks in table have to be adjusted for each change of angle. Lower guide is either larking entirely or has to be adjusted for each change of angle. Drive pulleys shift their position in changing angle, presenting some formidable difficulties in belting up the machine. Machines not well suited for common plain sawing. Tension of saw may vary when changing angle. Angle cannot be changed while saw is in motion. The prices so extremely high as to prohibit the use of machines, except for a few lines of special work.

But, on this angle band saw these difficulties do not exist, as will be seen by carefully reading over the following descriptions: All the parts work automatically—no adjustments necessary in changing the angle of the saw. The entire operation is accomplished by simply turning the hand wheel at side of table until pointer indicates the desired angle on the graduated quadrant on the pedestal; and this may readily be done while saw is in motion. The hand wheel turns easily, as the weight of the upper part of the machine is properly counterbalanced. The location of the drive pulley is not changed, and the machine is as easily belted up as an ordinary band saw. The table is carried back on the pedestal in exact unison with the saw, so the saw keeps its proper position in the saw slot. Both the lower and the upper guide keep in exact alignment with the saw, and the lower guide keeps a proper distance from the under side of the table. The tension of the saw does not change when angle of saw is changed. The machine is just as well adapted in every way for common plain sawing as an ordinary band saw. There are no complicated devices to get out of order, and it is owing to its simplicity that we are enabled to sell the machine at a much lower price than is usually charged for other machines of this class.

The arm is hinged to the pedestal in a very rigid manner by means of a heavy trunnion passing through them, concentric with lower shaft, making the machine just as rigid when tilted as when standing erect; and just as rigid and durable as an ordinary band saw. The bearings for lower shaft consist of solid bushings fastened into trunnion, and are provided with oil chamber and capillary felt, making them practically self-oiling and dustproof. The upper bearing is made with revolving shaft running in adjustable bearings.

SPECIFICATIONS.

Size of hand wheels.....	36" x 2"
Distance clear between saw and arm.....	26"
Height clear under guide, when raised.....	18"
Size of table (iron).....	28" x 24"
Height of table from floor.....	41"
Size of tight and loose pulley.....	16" x 6"
Speed, revolutions per minute.....	400 to 450
Length of blade.....	14'
Floor space over all, when erect.....	40" x 63"
Height over all.....	93"
Cubic measure, boxed for export.....	84'
Gross weight, boxed for export.....	2,050 lbs.
Net weight.....	1,650 lbs.

MAY 1900

BAND SAWS.

DESCRIPTION FIG. 12159.

This machine is built from new patterns; has a cast frame in one piece; table of iron, 27" x 33", and adjustable from a level to 45°; the hand wheel regulating the tension of the saw, also the hand wheel lining the upper wheel, are both operated in front of machine. The guide bar is planed square and equipped with a first-class guide, and can be raised to saw lumber 16" thick. The wheels have iron hubs and spokes with hid wood rims, made in such a manner that they will remain true. The shipper will receive a belt from any direction. Wrench, brazing clamp, tongs, ½" saw and a ripping gauge are furnished. Tight and loose pulleys are 12" diameter, 4" face, and the best results are attainable from a speed of 375 to 400 revolutions per minute.

Weight, 1,100 lbs.

DESCRIPTION FIG. 12160.

Base.—Length, 46". Width, 23". Height, 7' 1½".

Table.—Length, 40". Width, 36". Height, 40" from floor. Bracket under table, 11" x 8½". Tilts 45° one way, 5° the other. Auxiliary table, 21" x 22".

Wheels.—Diameter, 38". Carry blades up to 2" wide.

Guide post.—1½" square. Maximum lift, 18".

OLIVER TYPE B BAND SAW.



FIG. 12160.

36" BAND SAW.

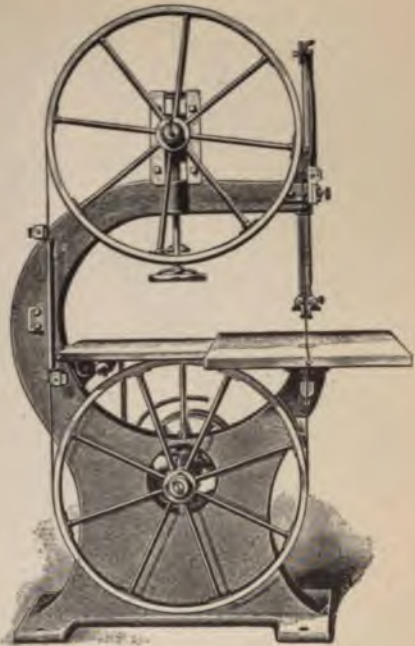


FIG. 12159.

Lower wheel shaft.—Diameter, 1¾". Length main bearing, 19½". Length outside bearing, 5".

Upper wheel shaft.—Length bearing, 12½". Diameter, 1½". Width between saw and column, 38". Total floor space, 4' 6" by 3' 6". Saw blade 20' long. Tight and loose pulleys 12" x 4½". Speed, 450 revolutions per minute.

Horse-power.—Maximum, 4.

Net Weight	Crated Weight.	Boxed for Export.	Size of Box.
3,000 lbs.	3,200 lbs.	3,500 lbs.	41" x 53" x 93".

EXTRAS.

No. 1, hand ripping fence 4" high for adjusting to the table, to be used when desired.

No. 2, hand ripping fence 6" high, for ripping wider timber.

No. 3, special hand ripping fence, operated from the front edge of table.

Spring roller for holding material to ripping fence when re-sawing lumber by hand.

Main belt to drive the machine should be 4" wide.

BAND SAWS.

OLIVER TYPE C BAND SAW.



FIG. 12161.

DESCRIPTION FIG. 12161.

Base.—Length, 40".
 Width, 22".
 Height, 6' 7½".
 Table.—Length, 36".
 Width, 30".
 Height, 40".
 Bracket under the table: 4" x 7½", tilts 45° one way and 7° the other.
 Auxiliary Table.—Size 19" x 23".
 Wheels.—Diameter, 36".
 Carry blades up to 1½".
 Guide Post.—1½" square.
 Maximum width, 18".
 Lower Wheel Shaft.—Diameter, 1½".
 Length of main bearing, 13".
 Outside bearing, 5".
 Upper Wheel Shaft.—Length of bearing, 11".
 Diameter, 1½".
 Saw Blades.—Length, 19".
 Tight and Loose Pulleys.—Size, 12" diameter, 4¼" face.
 Speed.—500 revolutions per minute.
 Width between saw and column, 36".
 Floor Space.—4' x 5".
 Horse-power.—Maximum, 4.

Net Weight.	Crated Weight.	Based for Export.	Size of Box.
1,600 lbs.	1,800 lbs.	2,200 lbs.	40" x 50" x 50"

EXTRAS.

No. 1, hand-ripping fence 4" high, for adjusting to the table, to be used when desired.
 No. 2, hand-ripping fence 6" high, for ripping wider lumber.
 No. 3, special hand-ripping fence, operated from the front edge of table.
 Spring roller for holding material up to the ripping fence when resawing lumber.
 Main belt to drive machine should be 4" wide.

DESCRIPTION FIG. 12162.

Floor space, 60" x 40".
 Height of column, 7".
 Diameter of wheels, 36".
 Height under guide, 16".
 Swing between saw and column, 36".
 Maximum width of saw can be used, 1½".
 Saws 19" long can be used.
 Table 40" from floor.
 Table 28" x 34".
 Auxiliary table 14" x 18".
 Guide post 1¼" square.
 Length of main bearing to lower wheel, 14"; diameter, 1½".
 Length of main bearing to upper wheel, 10"; diameter, 1½".
 Tight and loose pulleys, 12" x 4". 500 revolutions per minute.
 Horse-power.—Maximum, 3.

Size.	Net Weight.	Crated Weight.	Based Weight.
36"	1,400 lbs.	1,600 lbs.	1,900 lbs.

EXTRAS.

No. 1, hand-ripping fence, 4" high.
 No. 2, hand-ripping fence, 6" high.
 No. 3, hand-ripping fence, to be operated from the front edge of the table.
 Spring roller device to hold material to the ripping fence when resawing. Main belt to drive the machine should be 3½" wide.

OLIVER TYPE D BAND SAW



FIG. 12162.

BAND SAWS.

DESCRIPTION FIG. 12163

The accompanying engraving represents our new patent band sawing machine, which embraces all our recent improvements, and combines all the requisites of a first-class machine.

The frame is exceedingly well proportioned, cast in one piece and corrod out, with the iron equally distributed, making it very rigid and strong.

The wheels are 36" in diameter, with 2" face, the upper wheel having a hardwood rim, glued up from thin dry veneers, making a continuous rim, covered with pure rubber, ground perfectly true, and has hollow wrought spokes, set staggering, making a neat, light and strong wheel to carry any width of saw up to 1½". The lower wheel is of solid (web) iron, which gives solidity and speed, prevents vibration and controls the momentum.

The upper and lower shafts revolve in self-oiling connected double boxes, lined with genuine babbit metal. The lower box is bolted to the frame, with necessary adjustments to take up wear. The loose pulley is self-oiling and can be run about one month without refilling the oil chamber.

The upper wheel is adjusted vertically by means of a hand wheel. There is a spring to maintain uniform tension, and compensate for the expansion and contraction of saw. The strain may be increased or decreased according to the density of the work. The upper wheel can be angled to lead the saw in any desired path from the front of the machine by means of a lever, as shown in cut.

The table is of iron, planed perfectly true, and may be tilted for bevel or conical sawing up to 45° to the right and 10° to the left.

Our patent tilting device, or lock, is new and very ingenious, with many points of advantage over the old style. It consists of two parts, dovetailed and perfectly turned and fitted together, with a lever for tightening, and has no babbitted bearings. It is quick acting and of great convenience to the operator, no wrenches being required. It is operated by means of a handle, as shown in cut, and the table can be quickly and accurately adjusted to any desired angle while the operator remains standing, and without changing his working position.

The table, tilting as it does on dovetailed slides, remains rigid at all times, and when set to any certain angle, does not move from the set angle while being tightened or locked, as is the case with the old style tilting device. Size of table, 29" x 35"

The guide bar is made square, insuring permanent alignment, and is provided with a counterbalance. The upper guide is of the non-friction roller type.

The belt shifter and all adjustments are in close reach of the operator, and can be made without changing his position.

The belt shifter is so arranged that the machine may be belted from the top or below, or from either side, as may be desired.

The saw will take 18" under the guide, and 36" to the frame.

We furnish with each machine one saw blade, ready for use, and brazing tongs and vise. Length of saw, 19' 5"

Every machine is put under belt, and carefully tested on actual work, and warranted first class in every respect.

Tight and loose pulleys are 14" x 4½" and should make 500 revolutions per minute. Weight, 1,500 lbs.

36" PATENT BAND SAW

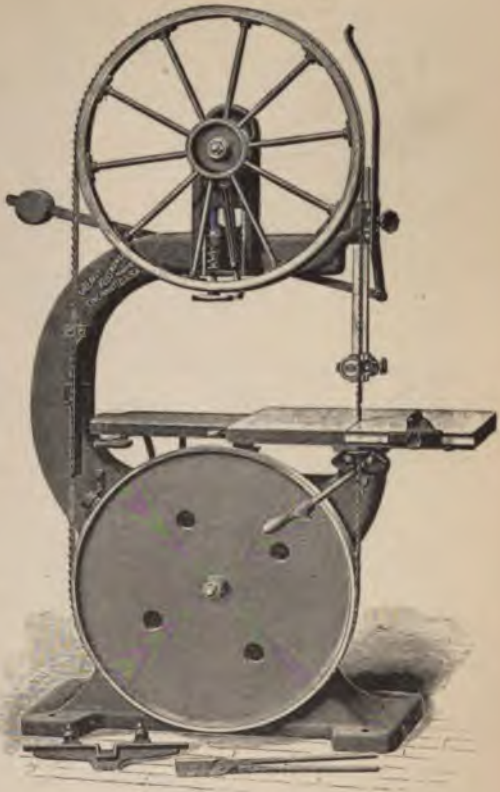


FIG. 12163.

BAND SAWS.

DESCRIPTION FIG. 12164.

36" HEAVY BAND SAW.

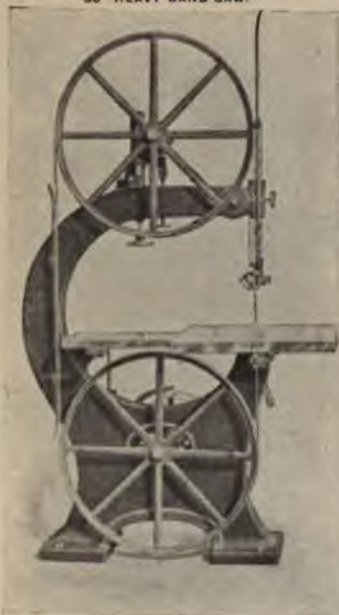


FIG. 12164.

In this machine our aim is to have everything of the best. The design is heavy and massive, yet the lines are most graceful and pleasing. Utmost strength and durability predominate in every detail. Frame is cast solid in one piece, cored out hollow throughout. The front fender is attached to guide bar, a new feature that gives additional safety. An entirely new tilting table arrangement is used. By releasing the clamping lever, the table is free to tilt to any angle up to 45°. Table segment works in a machined tongue and groove that slides free and easy, but holds table perfectly aligned while being tilted. A graduated scale and pointer indicate the desired angle. One motion of lever holds table rigid at any point. This works much quicker and is more practical than any screw arrangement for tilting a band saw table. A slight intilt can also be obtained.

Regular Equipment.—The following items are included with each machine, and need not be mentioned in ordering: One Wright's guide above table, one common guide below table, one pair braising tongs, one braising clamp, one saw blade $3\frac{1}{4}$ " wide.

Options and Extras.—Customers can select any width saw up to 1' wide without extra charge. Wood rim wheels and ripping gauge can be furnished, but will be charged for extra.

SPECIFICATIONS.

Size of band wheels, face.....	36" x 2"
Distance clear between saw and frame.....	38"
Height clear under guide when raised.....	21"
Size of table (iron).....	30" x 30"
Size of tight and loose pulleys.....	16" x 4"
Speed, revolutions per minute.....	350 to 450
Length of saw blade.....	20' 4"
Floor space required over all.....	44" x 62"
Cubic measure, boxed for export.....	54'
Gross weight, boxed for export.....	1,850 lbs.
Net weight.....	1,450 lbs.

DESCRIPTION FIG. 12165.

This engraving represents our No. 2 patent 36" band, scroll, rip, and resawing machine, which is a most conveniently arranged tool for doing various kinds of band, scroll work, ripping and resawing lumber. It is a combination of three machines in one, and it can be changed, in a few moments' time, from one class of work to the other. It has proven to be a most desirable and useful machine for woodworkers in general. It is suited to the very finest scroll sawing required in piano and organ factories, pattern shops, fancy woodworkers, etc., as well as the heavier kinds of work, such as cutting plow beams, wagon and carriage wood stocks, agricultural implement parts, ship and car work, sawing hard wood with saw blade as wide as 2". All the adjustments on this machine are so perfect that it can be run constantly without injury to the saw blade or the machine.

The frame, of modern design, is entirely new. It is cast in one piece with cored center, making it strong and reliable, and it is provided with a broad floor base to stand firm.

The mangle supporting the upper wheel is accurately fitted to the frame in planed and scraped angle ways, and it is adjustable up or down by hand wheel and screw, to accommodate various lengths of saw blades, taking, at the longest, a saw $18\frac{1}{2}$ ".

BAND SAWS.

NO. 2 PATENT 36" BAND,
SCROLL RIP, AND
RESAWING MACHINE.

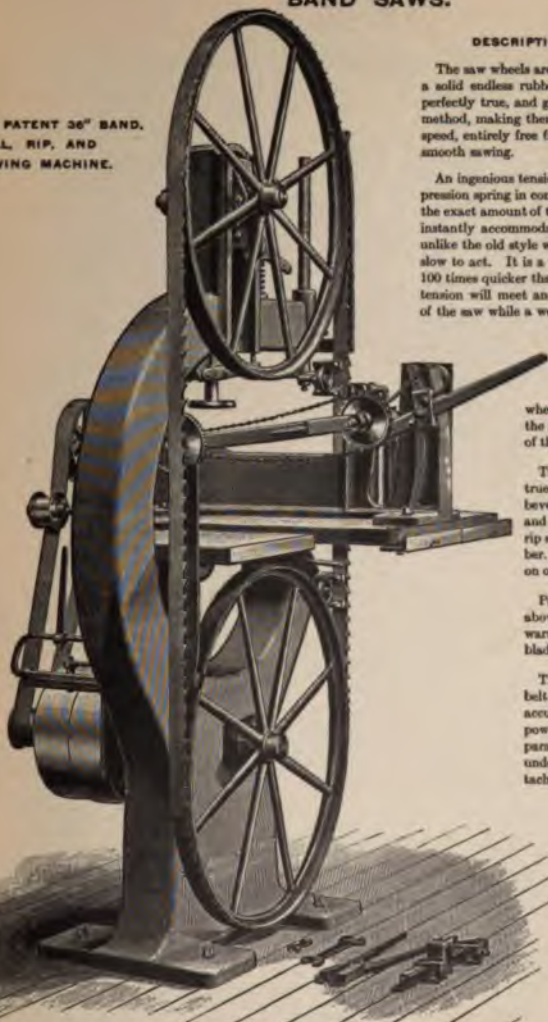


FIG. 12185.

shipper, to be operated from the working side of the machine, and they should run 500 turns per minute. The loose pulley is fitted with bronze bearings and self-oiling device.

Horse-power to drive, $2\frac{1}{2}$; floor space occupied, $42'' \times 60''$ Net weight, 1,900 lbs.

DESCRIPTION FIG. 12185.—Continued.

The saw wheels are 36" diameter, $2\frac{1}{2}''$ face, covered with a solid endless rubber band, $\frac{1}{4}''$ thick; they are ground perfectly true, and given a running balance by our patent method, making them capable of running at a high rate of speed, entirely free from vibration, an essential feature for smooth sawing.

An ingenious tension device secured by the use of a compression spring in connection with the upper wheel provides the exact amount of tension to the saw, under all conditions, instantly accommodating itself for light or heavy sawing, unlike the old style weight affair, which is cumbersome and slow to act. It is a well-known fact that a spring will act 100 times quicker than a weight, which means that a spring tension will meet and correct 100 variations in the strain of the saw while a weight is getting in motion to take care of one, and very likely, because of its inertia, missing that. The saw will cut perfect work only when the tension is accurate. By a single hand screw, the upper saw wheel can be tilted, while running to lead the saw to any path desired over the face of the wheels.

The table, of iron, is $30'' \times 34''$, planed true and arranged to tilt up to 45° angle for bevel sawing. The top is laid off in inches and fractions, and fitted with a patent rip saw gauge, to be used for ripping lumber. This gauge can be instantly placed on or removed from the machine.

Patent non-friction guides are used above and below the table, and they are warranted not to heat or injure the saw blade.

The resawing attachment is driven by a belt from the lower wheel shaft. It is accurately fitted with cut gears and a powerful feed, and it will resaw either parallel or beveling, up to $12''$ wide and under, in different thicknesses. This attachment, like the rip saw gauge, can be quickly placed on or off the machine.

This machine measures 36" from the inside of the frame to the center of the table, giving ample room for wide sawing. When the guide stem is lifted to its highest position, it will take work $12\frac{1}{2}''$ thick.

All spindles are of forged steel, and run in long self-lubricating bearings.

The tight and loose pulleys are 14" diameter, 4" face, and provided with an improved belt

BAND SAWS.

NEW 40" BAND SAW.

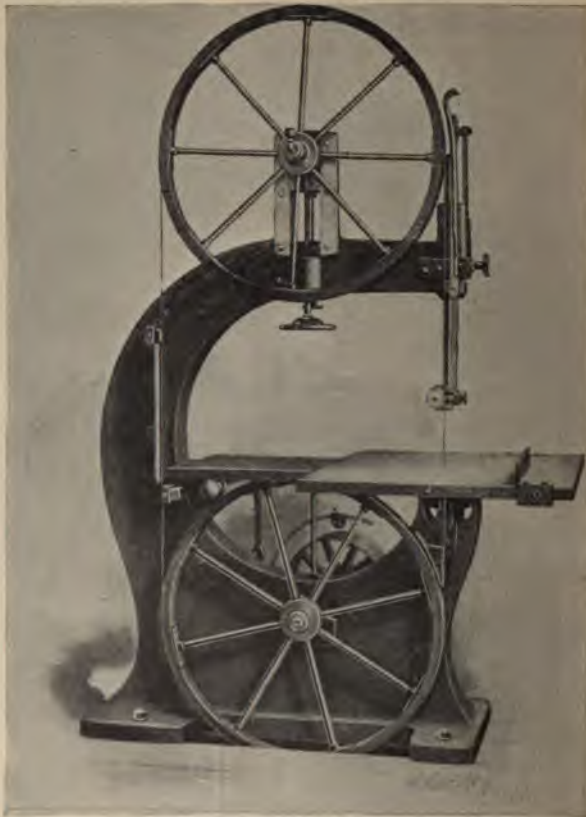


FIG. 12166.

DESCRIPTION FIG. 12166.

This machine is built from new patterns, has a cored frame, cast in one piece. The table is of iron, 33" x 42", and tilts to an angle of 45°. The hand wheel regulating the tension of saw, also the hand wheel lining the upper wheel, are both operated in front of the machine. The guide is planed square, is counterbalanced and equipped with a first-class patent non-friction saw guide. The wheels have iron hubs and spokes, with laid wood rims, made in a manner that guarantees them to remain true.

A belt shifter is furnished and will receive a belt from any direction. Wrench, bracing clamp, tongs, $\frac{3}{8}$ " saw and an adjustable ripping gauge are furnished. Saws stock 20" thick. Tight and loose pulleys are 16" in diameter, 4" face, and should make 500 revolutions per minute. Length of saw, 21' 2".

Weight, 2,000 lbs.

BAND SAWS.

DESCRIPTION FIG. 12167.

NO. 4 PATENT
POWER FEED
BAND RIPPING
SAW.

This engraving shows our No. 4 patent power feed band ripping saw, which represents the very highest type of this class of machinery. It is perfectly safe to operate, there being no tendency to throw the stock back, as with a circular saw, and the saw kerf, being much less, effects a large saving in lumber, and it cuts much smoother and truer. It will take 30' between the fence and saw blade, and any size narrower, and up to 12" thick and under. It will saw the stock square or to any bevel, as the table is provided with a tilting adjustment, a most desirable feature for sawing out molding blanks and other bevel work, which cannot be performed on any other power feed band ripping saw on the market. It also has the advantage of ripping exceedingly short or long material, as the feeding rolls are close together. All the adjustments are made from the working side of the machine. The starting and stopping, changing the rate of feed for sawing various widths and thicknesses of lumber, straight or beveling, all can be quickly made without the operator leaving his position.

The frame, of modern design, is cast in one piece, with cored center, is very heavy and stiff, to overcome all tendency to spring or vibrate when doing the very heaviest class of work, and it is provided with an exceedingly wide floor base to stand firm.

Description continued on next page.

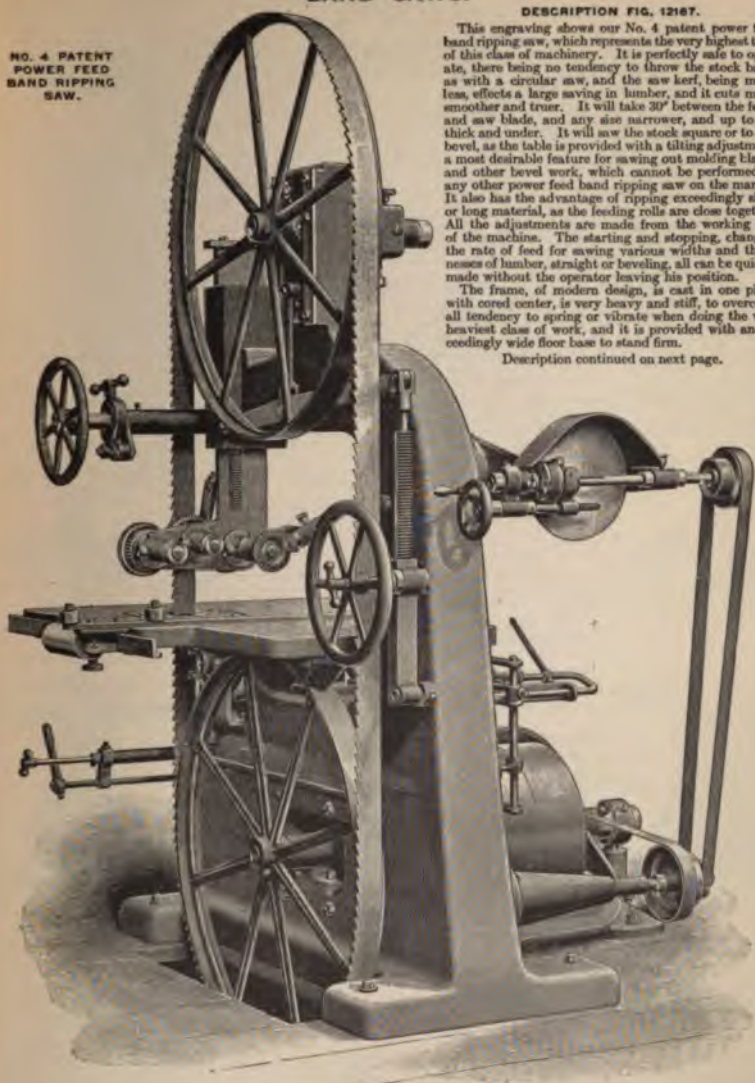


FIG. 12167.



BAND SAWS.

DESCRIPTION FIG. 12167.—Continued.

The table is exceedingly large and roomy, and it is fitted with rollers both in front and behind the saw to prevent friction. It is plainly laid off, with a scale, in inches and fractions, to quickly set the gauge the desired distance from the saw. This gauge or fence can be used on either the right or left hand side of the saw, and it is equipped with a horizontal roller at the front end and two vertical rollers on top to remove as much friction as possible, to make the lumber pass through the machine with the greatest ease. The table can be instantly tilted to any angle up to 45° to a scale underneath the table.

The wheels are 44" diameter, ground perfectly true, and balanced by our patent rotary balancing machine, making them capable of obtaining a high rate of speed, entirely free from vibration. The wheel spindles are of steel, extra heavy, and they rotate in long, self-lubricating bronze bearings. An ingenious spring device is used in connection with the upper wheel to secure the exact amount of tension to the saw blade, which instantly accommodates itself for light or heavy sawing, unlike the old-style weight affair, which is cumbersome and slow to act. It is a well-known fact that a spring will act 100 times quicker than a weight, which means that a spring tension will meet and correct 100 variations in the strain of a saw while a weight is getting in motion to take care of one, and very likely, because of its inertia, missing that. The saw will cut perfect work only when the tension is accurate. By this new device, it is almost impossible to break or injure the saw, and the saw can be instantly placed on or off the machine. By the adjustment of a single hand screw, the upper saw wheel can be tilted, while running, to lead the saw to any path desired over the face of the wheels.

The patent saw guides will not heat or injure the saw, enabling the machine to run constantly on the heaviest work. The feed is very powerful. It is driven by cut gears, which furnish a perfectly steady motion, and it can be instantly adjusted to feed from 50" to 150" per minute, having four changes of feed. The feed rolls have a vertical adjustment by hand wheel to accommodate stock from 0 to 12" thick, with an automatic vertical movement of 1" to accommodate variations in thickness of stock, so that boards or plank of different thicknesses can be fed through the machine without cramping or injuring the working parts. By elevating the feeding apparatus to its highest position, the machine can be used, if desired, as a hand feed band-ripping saw. The saw blade furnished is 22½' long, 3" wide, 20 gauges, which furnishes a large amount of cutting surface, and, the blade being thin, removes a very small amount of stock.

The tight and loose pulleys are 20" diameter, 6" face, and should run 500 rotations per minute. The loose pulley is fitted with bronze bearings and a self-oiling device, and is equipped with a convenient belt-shipping apparatus, which is operated from the working side of the machine.

Horse-power to drive, 5; floor space occupied, 70" x 75".

NO. 1 SCROLL SAW.



FIG. 12168.

SCROLL SAWS.

DESCRIPTION FIGS. 12168 TO 12170.

The No. 1 machine has tilting table, the No. 2 stationary table. In all other respects they are exactly similar and the descriptive matter applies equally well to either.

The table is made of narrow strips of thoroughly seasoned and kiln-dried maple and is provided with iron cleats. A metal plate 8" in diameter prevents excessive wear at the center.

The straining device is shown clearly in the large illustration and is deserving of special attention. All the working parts are supported on the tube *S* which is mounted on the casting *O* in such a manner that the whole device may be adjusted vertically to admit of using blades of different lengths. To facilitate this adjustment the weight of all parts is balanced by a spring. The eccentric lever *F* clamps the tube *S* and the parts attached, in any desired position. The adjustable stop *L* is adapted for holding down the work and carries steel bearings for supporting the saw at the sides and back. The tension is obtained from coiled springs *BB*, and may be regulated as desired. The levers and connections are so arranged that the strain on the blade is practically constant at all points of the stroke. The lever bearings are hardened, self-oiling, and very durable. The air pump *T* furnishes a strong blast and has no working joints. (See following page.)

The friction pulley used for driving the machine is much superior to the tight and loose pulleys commonly used. It is simple in construction and adjustable for wear. The foot lever at the

front of the machine operates the clutch, and when this is thrown out applies a brake to the crank wheel. An oil chamber in the shaft keeps the pulley thoroughly lubricated.

The lower cross head runs in planed guides set square with the table. Should any heating occur the expansion loosens it slightly and by thus removing the cause overcomes the difficulty.

The saw clamps are, as far as it is possible to make them so, self-acting. A slot filed in the lower end of the blade is engaged by a hardened steel jaw. A pin in the upper end is held by a hook in the upper cross head, which is pulled down by the lever *K* when putting a blade in place.

NO. 2 SCROLL SAW.



FIG. 12169.

	Shipping Weight.	Speed of Crank Shaft.	Friction Pulley.	Size of Table.
No. 1 machine.....	500 lbs.	825	8¾" x 3"	38" x 40"
No. 2 machine.....	450 lbs.			

With each machine is furnished one dozen assorted blades, also wrench for adjusting the strain springs.

THE PATENT SAW COMPANY

SCROLL SAWS.

NO. 1 SCROLL SAW STRAIN.

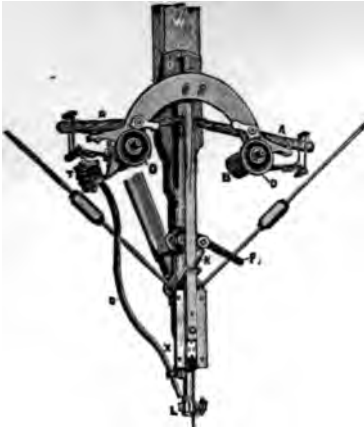


FIG. 12170.

(For description see preceding page.)

NO. 3 SCROLL SAW.



FIG. 12171.

NO. 4 SCROLL SAW.



FIG. 12172.

DESCRIPTION FIGS. 12171 AND 12172

These machines are very similar to those shown on preceding page and nearly all of the descriptive matter on preceding page applies to them also. They differ from each other only in the style of base, the No. 3 machine having an all iron frame while the No. 4 machine is supported on wood legs. They are as carefully made as any tools that we build and in many cases will meet the requirements fully as well as more expensive machines.

The table is of thoroughly seasoned and kiln-dried hardwood, securely cleated and provided with an iron plate at the center to prevent excessive wear at that point.

The straining device is almost exactly similar to that furnished with the No. 1 and No. 2 machines, differing from it only in the method of support. The wood piece W is extended downward and takes the place of the casting used on the other machines. The device is vertically adjustable, for different lengths of blades, and is balanced by a spring as shown in the illustration. The coiled springs and levers are so arranged that the tension in the blade is the same at all points of the stroke.

The friction pulley by which the machine is driven is self-oiling, simple in construction and very efficient. The clutch is operated by the foot lever which also applies a brake to the crank wheel when the machine is to be stopped.

The lower cross head is adjustable and cannot run hot. The expansion due to any slight heating loosens it on the guides, thus preventing further trouble.

The saw clamps hold the blades firmly and are self-acting. They are the result of years of experimenting and have proved their superiority.

SPECIFICATIONS.

	Shipping Weight.	Speed of Crank Shaft.	Friction Pulley.	Size of Table.
No. 3 machine	400 lbs.	825	8 1/4" x 3"	36" x 40"
No. 4 machine	360 lbs.			

With each machine is furnished one dozen assorted blades, also wrench for adjusting the strain springs.

SCROLL SAWS.

IMPROVED SCROLL SAW.



FIG. 12173.

floor stand and four rests (one a double poll rest), back rest, five centers, one rosette chuck, two rest holders, countershaft hangers and pulleys, and eccentric clamp nuts, etc., for securing the stocks to the bed.

SPECIFICATIONS.

Size.	Swing Over Bed.	Swing at Head of Head Stock.		
24"	24"	6' 10"		
30"	30"	7' 4"		
	Net Weight.	Crated Weight.	Board Weight.	Size of Casts.
24"	1,250 lbs.	1,325 lbs.	1,400 lbs.	18" x 24" x 96"
30"	1,300 lbs.	1,375 lbs.	1,450 lbs.	18" x 30" x 96"

DESCRIPTION FIG. 12173.

The cut shown herewith represents our improved scroll saw, which, for simplicity, durability, and fast cutting, is not excelled by any machine on the market.

The frame is of the pedestal type and cast in one piece, curved through the center, and is wide at the base.

The table is of iron and planed perfectly true. The strain is adjustable, and of the most improved construction, and has a very sensitive and even action; is practically noiseless, and can be run in upper floor of a factory without shaking the building.

The slides are of the best gun metal, being adjustable, and are provided with self-oiling cups.

The cross head is of solid steel, constructed in such a manner as to work free and easy at all times.

By means of a combined shifter and brake, the machine can be instantly stopped and started.

This machine is built in the most improved manner, all parts perfectly fitted, and the material used of the very best. It is adapted for all kinds of scroll sawing, both heavy and light.

Each machine is carefully tested and tried in our works before shipping, and fully warranted.

The tight and loose pulleys are 6" by 3 $\frac{1}{2}$ " and should make about 1,200 revolutions per minute.

WOOD TURNERS' LATHES.

DESCRIPTION FIG. 12174.

This represents our highest and best type of lathe as furnished to those who prefer to make their own supporting bed, either from wood or metal, as they choose. It consists of the head stock, tail stock,

TYPE B OLIVER WOOD LATHE



FIG. 12174.

WOOD TURNER'S AND PATTERN MAKER'S LATHES.

20" SWING PATTERN MAKER'S LATHE, MOUNTED ON 6-FOOT HEAVY IRON SHEARS. ALSO FLOOR REST.

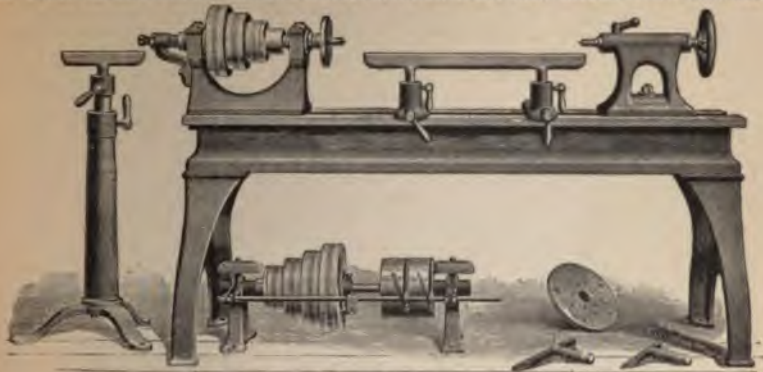


FIG. 12175.

DESCRIPTION FIG. 12175.

The cut presented herewith shows our recently improved wood-turning lathe, of superior workmanship and design.

The head and tail stocks are heavy, with hollow base and column, making them strong and reliable. The lathes are fitted with steel spindles of large diameter and have hard-wood cones, perfectly balanced and true. The boxes on the smaller sizes (12" and 16" swing) are lined with the best babbitt, and the larger sizes have phosphor-bronze boxes. All boxes are scraped to a perfect bearing. The heads have back-thrust screws, to receive the thrust of spindle. On pattern maker's or double-end lathes, the back-thrust screws are held in removable brackets. All of our head and tail stocks are accurately planed in line on the bottom, so that they will center on either iron or wood shears.

Wood turner's lathes are furnished complete, as follows: Head and tail stocks, one spur center, one cup center, one face plate, two rest sockets, one long double rest, two single rests, and complete countershaft.

With pattern maker's lathe, we furnish one extra face plate, for rear of head.

Floor rests for pattern maker's lathes, also bolts, clamps, and hand wheels, for attaching head and tail stocks and sockets to a wooden bed, are furnished at additional cost.

Lathes are built in five sizes, viz.: 12", 16", 20", 24", and 30" swing

Shears or beds can be supplied either of iron or wood in the following lengths, viz.: 6', 8', 10', 12', or 14'.

COUNTERSHAFTS.

12" swing lathe has 6" x 3½" tight and loose pulleys, making 900 revolutions.

16" swing lathe has 6" x 3½" tight and loose pulleys, making 800 revolutions.

20" swing lathe has 8" x 3½" tight and loose pulleys, making 700 revolutions.

24" swing lathe has 10" x 4½" tight and loose pulleys, making 600 revolutions.

30" swing lathe has 10" x 5½" tight and loose pulleys, making 500 revolutions.

DESCRIPTION FIG. 12176.

This lathe has been designed particularly for the use of manual training schools, and is specially adapted to the purpose. The machine is built in a first-class manner and of the best material, and fitted with every convenience for doing the work required of such a tool.

The spindles are of the best crucible steel, and the head stock boxes are filled with best babbitt. The cone has four steps for 1½" belt. The spindle is hollow, and the machine is equally available as a speed lathe. The bed is 33¼", and takes 22" between centers.

11" WOOD TURNER'S LATHE.



FIG. 12176.

WOOD TURNERS' AND PATTERN MAKERS' LATHES.

DESCRIPTION FIG. 12176.—Continued.

The machine is shipped complete with one patent countershaft, one common face plate, one screw center, one pair cup centers, one pair pointed centers, and three rests for wood turning.

The length of bed given on page 573 is the standard; any other length can be made if desired, and prices quoted on request.

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Power.	Face Spm.
11" lathe.....	450 lbs.	6" diameter, 2½" face	500	2 horse-power	4' 8" x 2' 4"

OLIVER SPEED LATHE.



FIG. 12177.

DESCRIPTION FIG. 12177.

Head Stock.—Length, 10¼". Width on bottom, 6"
 Spindle, 14½" long over all, 1¼" diameter.
 Hole through spindle, ¾" diameter.
 Spindle bored to receive No. 2 Morse taper.
 Spindle speeds, 2,675, 1,200, and 760 revolutions per minute.
 Cone on spindle—three steps—2¾", 4½" and 6½" diameter, 1¼" face.
 Width of belt, 1½".
 Floor to center of spindle, 42".
 Tail Stock.—Length, 7". Width on bottom, 6".
 Spindle, 8" long, 1¼" diameter. Receives No. 2 Morse taper.
 Traverse of spindle, 4".
 Amount of set-over, 1", when machine is so ordered.
 Adjusting screw eight threads to the inch.
 Bed.—Length, 45".
 Width, 6".
 Depth, 5".
 Height, floor to top of bed, 36".
 Countershaft.—Length, 26", diameter, 1¼".
 Hangers, 10" drop.
 Bearings, 5" long, 1¼" diameter.
 Cone—three steps—10", 12" and 14" diameter, 1¼" face.
 Speed, 525 revolutions per minute.
 Tight and loose pulleys, 8" x 2¼"; 2" belt required.
 Capacity.—Swings over bed, 12".
 Swings over rest, 9½".
 Turns, 24" long.
 Horse-power.—½.

Size.	Net Weight.	Skidded Weight.	Based Weight.	Size of Box.
12".....	335 lbs.	350 lbs.	450 lbs.	54" x 48" x 28"

Note: This lathe can be furnished with low bed to set on bench or without bed for mounting on wood bench, if so desired.

WOOD TURNERS' AND PATTERN MAKERS' LATHES.

PATTERN MAKERS' LATHE, WITH CARRIAGE-SLIDE REST.

RACK-AND-PINION HAND FEED.



FIG. 12178.

DESCRIPTION FIG. 12178.

The cut presented herewith shows our 20" swing pattern makers' lathe, mounted on 6' iron bed, with movable carriage, of superior design and workmanship.

The head and tail stocks are heavy, with cored base and column, making them strong and reliable, with large steel spindles of the best quality, and phosphor bronze boxes, scraped to a perfect bearing.

The head spindle extends through outer end of head stock, and is provided with an extra face plate for turning work of large diameter.

The head cones are of hard wood, very strongly constructed, having four speeds.

The bed is heavy, substantially braced, and planed perfectly true to receive the head and tail stocks, and dove-tailed for the movable carriage.

The movable carriage is of superior design, very solid, and is provided with a gib to take up any wear. The apron is fitted with steel pinions, engaging with steel cut rack and the carriage has a hand feed the entire length of bed. A combination plain tool block and hand T rest is furnished with carriage, and, if desired, a compound rest can be furnished at additional cost.

We furnish these lathes in three sizes—16", 20", and 24" swing—mounted on iron beds in any length up to 20'. Our 24" and 20" lathes have phosphor bronze boxes and 16" lathe has babbitted boxes, all carefully scraped to a perfect bearing.

Each lathe is furnished complete, as shown in cut.

An improved floor rest, with adjustable sleeve, furnished when desired, at additional cost.

16" swing lathe has 6" x 3½" tight and loose pulleys, making 800 revolutions per minute.

20" swing lathe has 8" x 3½" tight and loose pulleys, making 700 revolutions per minute.

24" swing lathe has 10" x 4½" tight and loose pulleys, making 600 revolutions per minute.

WOOD TURNERS' AND PATTERN MAKERS' LATHES.

TYPE B, OLIVER WOOD LATHE.



FIG. 12179.

DESCRIPTION FIG. 12179.

Head Stock.—Length, 28½"
 Spindle Bearings.—Front, 6" x 2¼";
 rear, 6" x 2¼"
 Spindles, 34" long over all.
 Hole through spindle, ¾".
 Spindle bored to receive No 4
 Morse taper.
 Speed of spindle, 86 to 1,800 revolutions
 per minute—eight changes.
 Cone on spindle—four steps—3", 8",
 10" and 12" diameter, 3½" face.
 Width of belt, 3½".

Tail Stock.—Length, 17½".
 Spindle, 16" long, 2" diameter.
 Traverse of spindle, 8"

Carriage.—Traverse of cross feed, 14".
 Traverse of cross feed on compound rest, 7"
 Tool post slot, 1¼" x ½".
 Travel of carriage, 8' 6" on 12' bed.

Bed.—Length, 12' 8"
 Width, 20½"
 Depth, 12".
 Height, floor to top of bed, 33".

Countershaft.—Length, 5', diameter, 1½"
 Speeds, 120 and 600 revolutions per minute.
 Bearings, 6" long, 1½" diameter.
 Hangers, 14" drop.

Tight and loose pulleys are 18" x 5" and 10" x 5".
 Small tight and loose pulleys give spindle 400 to 1,800 revolutions per minute.
 Large tight and loose pulleys give spindle 86 to 360 revolutions per minute.
 Cone—four steps—8", 10", 12" and 15" diameter, 3½" face.
 Horse-power.—Maximum, 4.

	Swing Over Bed.	Swing Over Carriage.	Swing at Rear of Head Stock.	Will Turn in Length.	Net Weight.	Crated Weight.	Boxed Weight.	Size of Box
24"	20"	6' 10"	8' 6"	4,200 lbs.	4,300 lbs.	4,500 lbs.	156" x 36" x 36"	
30"	20"	7' 4"	8' 6"	4,400 lbs.	4,500 lbs.	4,700 lbs.	156" x 62" x 36"	

Note: This lathe can be supplied with a plain hand feed carriage instead of automatic feed carriage, if so desired.

LATHE BACK REST.

DESCRIPTION FIG. 12180.

This back rest can be used upon any
 wood-turning lathe. Universally ad-
 justable, very convenient and adapted
 to every kind of work where a rest
 is desirable. Shipping weight with
 wrench, 60 lbs.



FIG. 12180.

WOOD TURNERS' AND PATTERN MAKERS' LATHES.

DESCRIPTION FIG. 12101.

Head Stock.—Length, 28½"; width, 12½"
 Height from base to center of spindle, 44"
 Spindle bearings—front, 6" x 2¾"; rear
 6" x 2¾"
 Spindle, 24" long over all; 2½" diameter.
 Hole through spindle, ¼"
 Spindle bored to receive No. 4 Morse taper.
 Gears on spindle—four steps—7", 9¼", 12"
 and 14½" diameter; 3½" face.
 Width of belt, 3¼"
Tail Stock.—Length, 17¼"; width, 12½"
 Spindle, 16" long; 2" diameter.
 Traverse of spindle, 8"
Carriage.—Length of bed, 54"; height from
 base, 33¼"
 Traverse of cross feed, 12"
 Traverse of cross feed on compound rest, 7"
 Tool post slot, 2½" x ¼"
 Travel of carriage bed, 34"
Sole Plate.—Length, 75"
 Width, 75" at head stock, 42" at opposite
 end.
 Height, 4"
 T slots 6½" between centers.
Extension Plate for Tail Stock.—Length, 54"
 Width, 23"
 Height, 4"
 T slots 6½" between centers.
Countershaft.—Length, 5"; diameter, 1¾"
 Speeds, 100 and 500 revolutions per minute.

OLIVER TYPE C COMBINATION PATTERN LATHE.



FIG. 12101.

Bearings, 6" long; 1½" diameter.
 Hangers, 14" drop.
 Tight and loose pulleys, 10" x 6" and 18" x 6".
 Cone pulley—four steps—12¼", 15", 17½" and 20" diameter; 3½" face.
 Small tight and loose pulleys give spindle 430 to 1,440 revolutions per minute.
 Large tight and loose pulleys give spindle 100 to 360 revolutions per minute.
 Horse-power.—Maximum, 4.

Size.	Swing over Base.	CAPACITY.	Will Turn in Length using Carriage and Tail Stock.	Will Cut Gear Teeth Diameter.
88"	88"	Swing at Head of Head Stock.	92"	As ordered.

WEIGHT, ETC.

Size.	Machine complete with tail stock and extension sole plate.	Net Weight.	Crated Weight.	Net Weight.	Base of Cams.
88"	5,500 lbs.	5,700 lbs.	6,300 lbs.	175 cubic feet.	
85"	4,000 lbs.	4,150 lbs.	4,600 lbs.	125 cubic feet.	

HAND PLANERS AND JOINTERS.

DESCRIPTION FIG. 12102.

In construction and design this machine is the exact counterpart of our larger jointers. But the dimensions being smaller, it has the following advantages: Less space required, less power, less cost and the knives are easier to keep in order. The head being of smaller diameter enables us to reduce the throat space between tables to a minimum. The machine has a four-sided steel head, slotted on two sides for special cutters. Tables are arranged for rabbeting, and tilting frames is provided. The countershaft has tight and loose pulleys, 8" diameter for 3" belt. Speed of countershaft should be 900 revolutions per minute to give the head a speed of 4,000 per minute. The pulley on the head is 3½" diameter and will admit of a 2½" belt, but 2¼" belt will be plenty wide to run the machine to best advantage.



FIG. 12102.

Length of tables	Foot, 33" over, 30"
Height of table from floor	30"
Floor space required over all	30" x 54"
Cubic measure, boxed for export	24"
Gross weight, boxed for export	1,000 lbs.
Net weight	800 lbs.

Regular Equipment.—The following items are included with each machine, and need not be mentioned in ordering: One pair (two) knives, one countershaft complete, one pressure spring, one wrench for knife bolts.



FIG. 12183.

12" AND 18" JOINTERS.

DESCRIPTION FIG. 12183.

This cut shows our latest construction in buzz planing machines. It is a strictly first-class tool and meets every requirement in a machine of this kind. It is simple in construction, and the adjustments are conveniently located and accurately and quickly made. The lines of the machine also commend it to every one who will critically examine it.

The tables are 7' in length, and each half is adjustable upon inclines, by means of the hand wheel in front. Steel lips, permitting the tables to be brought very close to the cutters for fine work, are put on when ordered. The tables may also be drawn entirely away from the cutter cylinder, giving ample space for adjusting or other purposes. The after-table is planed on the outside to the line of the cutters for rabbeting.

any part of the table and at any angle, or to plane any level desired. It is also used as a rabbeting guide. The cutter cylinders are made from forged crucible steel two sides slotted, and two sides tapped, providing for the use of both plain and irregular cutters. They run in self-oiling dust-proof boxes, yoked together. Either end of the yoke is adjustable, in case the knives become unevenly worn. The pneumatic pulley on the cutter cylinder is 4" diameter, 5" face, speed 5,000 to 6,000 revolutions per minute. Machine shipped skidded, complete with plain countershaft, two cutters and two wrenches. Patent countershaft, with ring oiling boxes and extra shaft for loose pulley, charged extra.

Machine.	Shipping Weight.	T. and L. Pulley	Speed.	Power.	Floor Space.
12" buzz planer.....	1,500 lbs.	8" diameter, 4" face	700	4 H. P.	2' x 7'
18" buzz planer.....	1,700 lbs.	8" diameter, 4" face	700	4 H. P.	3' x 7'



FIG. 12184.

IMPROVED HAND PLANER AND JOINTER.

DESCRIPTION FIG. 12184.

Tables over 7' long and have steel lips. Cylinder four-sided, slotted on two sides. Cylinder has three bearings, one of which is outside of pulley. Weight of 12" machine, 1,200 lbs. Weight of 16" machine, 1,400 lbs. Weight of 20" machine, 1,600 lbs. Weight of 24" machine, 1,800 lbs. Weight of 30" machine, 2,500 lbs.

This machine is of the very latest and most improved construction, is of great solidity and convenience of adjustments, in this respect far surpassing any other machine of its class. It is especially designed for making perfect glue joints, planing straight and out of wind squaring, smoothing, beveling, and cornering, chamfering, rabbeting, molding, beading, tongue and grooving, tenoning, etc., etc. The frame is cast in one piece, well proportioned, and is very heavy and strong. The table carriages move on continuous, inclined ways, which are deeply ribbed on both sides. The tables are more than 7' long, are very heavy and are dovetailed into the table carriages. Both tables can be drawn from the cutter head on a straight line independent of the inclined ways. By means of our patent table clamp lock this is accomplished instantly by simply loosening the handles shown on the front of machine. Either table can be adjusted independently by means of the large hand wheels, the inclined ways being of proper angle to secure the closest contact with the knives. The rear table has an adjustment for making hollow or spring glue joints.

Description continued on following page.

MAY 1900

HAND PLANERS AND JOINTERS.

DESCRIPTION FIG. 12184.—Continued.

The rear table on all machines is arranged for rabbeting.

The cutter head is a solid steel forging and is four-sided, being slotted on two sides to admit of moulding and other cutters being attached without removing the straight knives so that surfacing and moulding can be done at one operation. The cutter head is perfectly balanced and runs in three long, self-oiling boxes, one of which is an outside bearing. The boxes are lined with the best babbit and scraped to a perfect bearing.

The adjustable fence is attached to the rear or outfeeding table so that the fence sets down, flush with the rear table, leaving no opening. The fence can be instantly changed to any bevel, and can be moved across the table.

This machine is simplicity itself, and there are no wedges, links, pin joints, cams, or eccentrics under the table to wear or get out of adjustment.

By a system, and with tools and appliances specially designed for this purpose, the frame, table carriages, and tables are planed absolutely true, and the design and method of fitting up is such that the tables must be true and remain so, and they cannot twist, rock, strain, or be displaced.

The machine is made in five sizes—12", 16", 20", 24", and 30" wide.

The loose pulley on countershaft is self-oiling, and can be run about one month without refilling the oil chamber.

The tight and loose pulleys for countershaft on the 12" and 16" machines are 8" x 4½" and should make 1,000 revolutions per minute. For the 20", 24", and 30" machines the tight and loose pulleys are 10" x 5¼" and should make about 1,000 revolutions per minute.

OLIVER TYPE B HAND PLANER AND JOINTER.



FIG. 12185.

DESCRIPTION FIG. 12185.

Base.—Floor space—100" long, 33" wide on 30" machine.

Height to table, 33"

Table.—Operating section 5' 4" long.

Front or supporting section, 3' 4" long.

Width according to knives used.

Draw away from cylinder, 18"

Vertical adjustment, 1"

Tilting device swings table 5° to 7°

Cylinder.—Main journal, 1½" in diameter, 8" long.

Outside journal, 1¾" in diameter, 6" long.

Cutting diameter, 4¾", square 3½"

Pulley, 4" diameter, 5½" face.

Speed, 4,200 revolutions per minute.

Fence.—Length, 5'; width, 5'; bevels to 45°.

Permits full width of table to be used.

Countershaft.—Length, 3½"; diameter, 1½"

Hangers, 14" drop; bearings, 6" long.

Tight and loose pulleys, 10" diameter, 6" face.

Driving pulley, 20" diameter, 5½" face.

Speed, 800 revolutions per minute.

Capacity.—Will plane 16", 20", 24", or 30" wide.

Horse-power.—Maximum, five.

Size.	Net Weight.	Crated Weight.	Blind for Export.	Size of Box.
16".....	2,800	3,000	3,400	10' x 6' x 3' 6"
20".....	3,000	3,200	3,600	10' x 6' 6" x 3' 6"
24".....	3,400	3,600	4,000	10' x 6' 10" x 3' 6"
30".....	3,700	3,900	4,300	10' x 5' x 3' 6"

The belt for driving cylinder should be 5" wide and not less than 16" long.

Main belt for driving countershaft should be 5½" wide.

SINGLE SURFACERS.

SINGLE SURFACE PONY PLANER.



FIG. 12186.

DESCRIPTION FIG. 12186.

This single surfer is a thoroughly satisfactory machine for small work. The frame, cast in one piece, is rigid and capable of sustaining any strain that can come upon it. The bed is also cast solid, has an easy, vertical adjustment, with the adjusting wheel and indicator at the most convenient point. The two top feed rolls are geared together, and the front roll is fluted. Anti-friction rolls are let into the table directly underneath.

The cutter cylinder is made from crucible steel forging, and finished in the most approved form for doing fine work; it carries two cutters, and one pneumatic pulley. There are adjustable pressure bars close to the cylinder on each side. The shaving hood swings back, giving free access to the cutters and adjusting parts. The machine works long or short stock equally well. The machine is built in two sizes, 24' x 6' and 28' x 6'. Feed rolls are 9' between centers.

The machine is shipped complete with one set cutters, wrenches, and countershaft.

SPECIFICATIONS.

Machine.	Shipping Weight.	T. and L. Pulleys.	Speed.	Power.	Floor Space.
24' pony planer.....	1,500 lbs.	10" diameter, 6" face	1,000	3 horse-power	3½' x 4½'
28' pony planer.....	1,600 lbs.	10" diameter, 6" face	1,000	3 horse-power	3½' x 4½'

PONY PLANER AND MATCHER.

DESCRIPTION FIG. 12187.

This single surfer and matcher is the latest and best machine for small work on the market. The frame, cast in one piece, is rigid and capable of sustaining any strain that can come upon it. The bed is also cast solid, has an easy vertical adjustment with the adjusting wheel and indicator at the most convenient point. The two top feed rolls are geared together and the front roll is fluted. Anti-friction rolls are let into the table directly underneath.

The cutter cylinder is made from crucible steel forging, is finished in the most approved manner for doing fine work, and carries two cutters, each 28" long. There are adjustable pressure bars close to the cylinder on each side. The shaving hood swings back, giving free access to the cutters and adjusting parts. The machine works long or short stock equally well.

The two wing matcher heads are mounted on ways upon the bed, and the left-hand head is adjustable to match any width up to 11" wide and 2" thick. These heads are easily removable, and the machine may be used up to its capacity for surfacing.

The machine is shipped complete with countershaft, two planer knives, cutters for matching ¼", ⅜", and ½" tongue and groove, and four 2" jointing cutters; and wrenches as are needed.



FIG. 12187.

SPECIFICATIONS.

Machine.	Shipping Weight.	Tight and Loose Pulleys.	Speed.	Power.	Floor Space.
Pony planer and matcher	1,700 lbs.	10" diameter, 6" face	1,000	3 horse-power	3½' x 4½'

KAYE P O M A Y B H T

SINGLE SURFACERS.

24" PANEL PLANER.

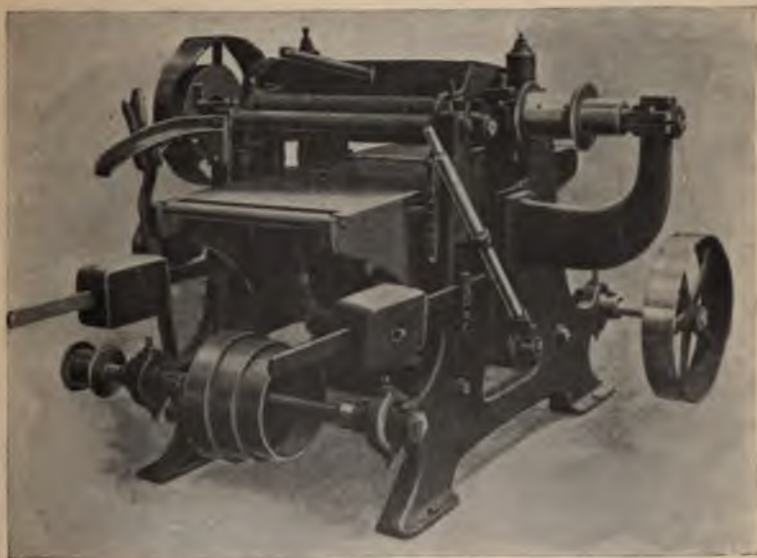


FIG. 12188.

DESCRIPTION FIG. 12188.

This valuable machine is intended for fine shop work, and is used by car builders, sash and door, cabinet, pattern, and cigar-box makers. It will plane from $\frac{1}{8}$ " to 8" in thickness, and as short as 4", without clipping the ends of work. The cutter head is made of solid forged steel, has large journals, long boxes, and is furnished with outside bearing; has pressure bars on either side of cutter head; the receiving pressure bar is weighted and swings in a circle around the knives, keeping the same relative distance at all points; the feed has three changes and is strong and reliable; the receiving feed roll is weighted.

This machine will do the finest work on either hard or soft wood, and has no superior.

Tight and loose pulleys are 10" in diameter, and 5" in face, and should make 900 revolutions per minute.

Built in two sizes.

SIZES.

20" planer and countershaft—weight, 1,750 lbs.

24" planer and countershaft—weight, 1,850 lbs.

SINGLE SURFACERS.

24" DOUBLE-BELTED DOUBLE-GEARED PLANER.

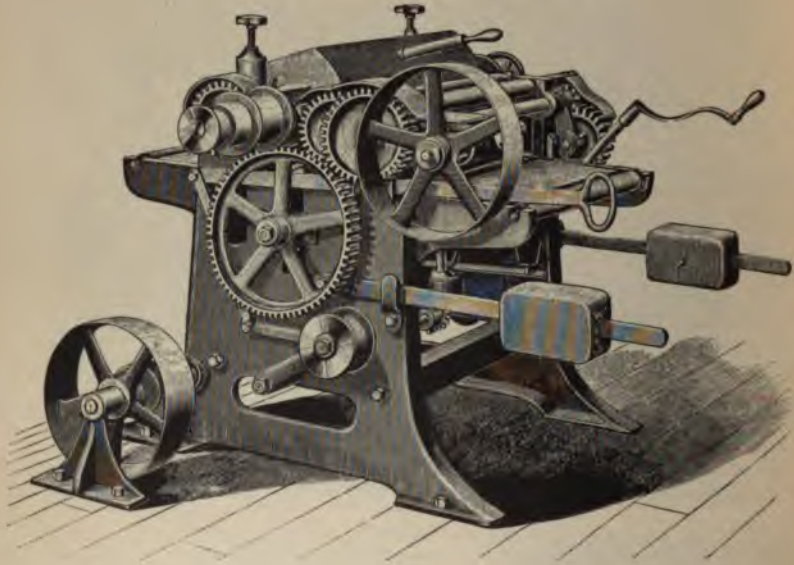


FIG. 12189.

DESCRIPTION FIG. 12189.

This machine is intended for light and heavy planing, in either hard or soft wood. The feed-rolls are all driven, giving a powerful and reliable feed, and have two changes of feed. Will plane 24" wide and from $\frac{1}{16}$ " to 7" in thickness. The cutter-head is of forged steel; has three long bearings and is driven by two belts. Has two pressure bars, the receiving one weighted and swings clear of knives. The machine does a fine grade of work and will not tear out or clip ends of lumber.

Tight and loose pulleys, 10" in diameter and 5" face, and should make 900 revolutions per minute.

Weight, 2,300 lbs.

SINGLE SURFACERS.

VARIABLE FEED PLANING MACHINE.

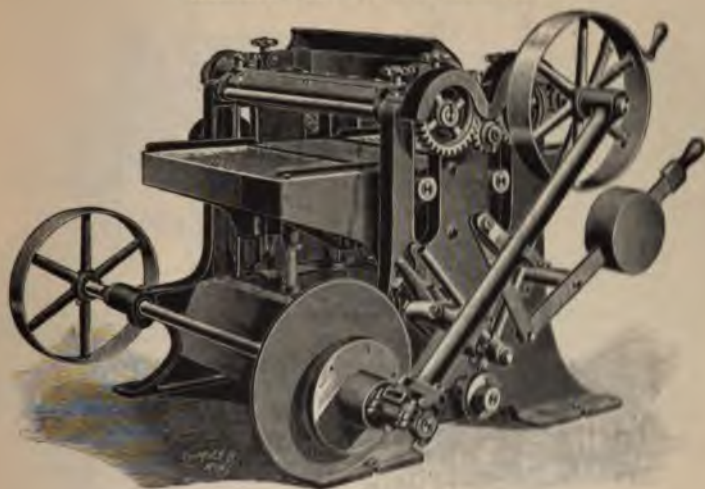


FIG. 12190.

DESCRIPTION FIG. 12190.

This planer is provided with a thoroughly approved variable feed, which can be instantly changed from working to 100 per cent by moving a lever, or if desired the feed can be reversed and the material backed out of the machine. This machine will do the finest and smoothest work on hard or soft wood, and will plane from $\frac{1}{8}$ " to 8" in thickness by 34" wide.

The feeding rolls are of solid steel with large bearings and are powerfully geared, all the gears being self-oiling. The cutter heads are of hard, crackle steel, and have bearings 2" in diameter and of ample length. The knives are hard with genuine bakelite metal and are self-oiling, and can be adjusted by set screws so that no space between edges and knives are needed. The genuine iron pin of improved construction and will hold sheet planes firmly so that no end chipping can possibly occur.

For planing wet or dry lumber, the lower rolls can be quickly raised by means of a lever, thus carrying the material clear of the bed.

The bed, which is cast in one piece, is provided with a removable bed plate and can be easily changed to the other by means of compound levers operated by a hand lever projecting from the front end of the bed, thus being away with the height of the bed setting while in use.

A knife-jointing attachment accompanies each machine, by which the knives can be kept absolutely straight and true with each other.

This planer is made to form one or both sides and is constructed of the best materials in a best-class manner, and is guaranteed in every respect.

Pulleys on motor shafts are 12" in diameter, 4" long, and should run 1,000 revolutions per minute. Tight and loose pulleys on counter shafts are 10" in diameter by 10 1/2" long, and should run 100 revolutions per minute.

SINGLE SURFACERS.

NO. 2 SURFACE PLANING MACHINE.

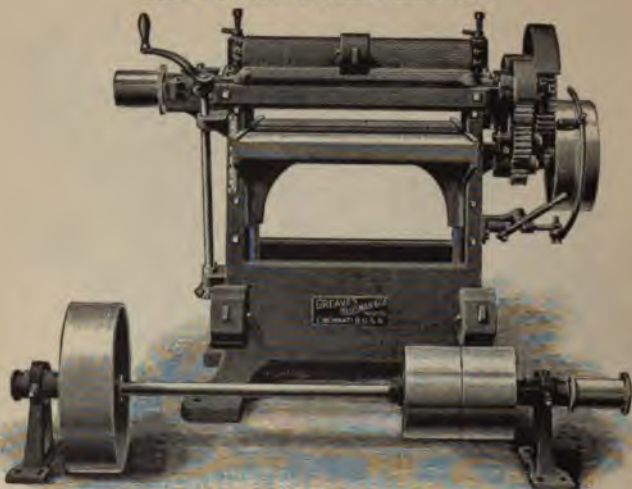


FIG. 12191.

DESCRIPTION FIG. 12191.

The cut shown herewith represents our newly designed No. 2 surfer and planer, to plane $24\frac{1}{4}$ " wide, and from $\frac{1}{8}$ " to 8" thick on hard or soft wood, which, for smooth planing, strong and fast feeding, and excellence of design and workmanship, is not surpassed by any machine of its class.

The frame is cast in one piece, wide at the base, very heavy, and of great strength and solidity.

The table or bed is also cast in one piece, planed perfectly smooth and true, and is dove-tailed into the frame, with extra long bearings, as wide apart as the width of frame will allow, making the table as steady as if it and the frame were cast in one piece. Any wear can be instantly taken up by means of gibs and set screws. The table is raised and lowered by means of the large crank handles shown in cut, an indicator on one side of frame showing the exact thickness the machine is set to plane.

The cylinder is single belted. It is made of the very best forged steel, with extra large journals, which run in extra long self-oiling boxes, lined with the best babbitt and provided with improved oil wells and oil cups.

Both pressure bars work very close to the knives, and are adjustable to the timber independently of each other and the feed rolls, thus insuring steadiness, even when planing very short and thin stuff. The pressure bars are self-adjusting, always regulating themselves to the various sizes of thick and thin lumber being planed.

The feed is driven from the countershaft, and is instantly stopped or started by means of the belt shifter. The feed consists of four large steel rolls. The lower rolls extend the full width of bed, having their bearings in planed ways in the frame. Feed gearing is very powerful, the roll gears being connected by our improved yoke, keeping the gears in perfect mesh at all times and insuring a steady and positive feed. The feed rolls are set as close to the cylinder as possible and arranged to hold the board firmly to the bed.

The upper in-feeding roll is fluted and is held down by connected levers and weights, and the out-feeding roll is held down by large coiled steel springs, making a strong and positive feed. The tight and loose pulleys are $10" \times 6"$, and should make 1,050 revolutions per minute. Weight, 1,900 lbs.

SINGLE SURFACERS.

NO. 2½ SURFACE PLANING MACHINE.



FIG. 12192.

DESCRIPTION FIG. 12192.

The cut shown herewith represents our newly designed No. 2½ surface and planer, to plane 24½" wide, and from ½" to 8" thick on hard or soft wood, which, for smooth planing, strong and fast feeding, and excellence of design and workmanship, is not surpassed by any machine of its class.

The frame is cast in one piece, wide at the base, very heavy, and of great strength and solidity.

The table or bed is also cast in one piece, planed perfectly smooth and true, and is dove-tailed into the frame, with extra long bearings, as wide apart as the width of frame will allow, making the table as steady as if it and the frame were cast in one piece. Any wood can be instantly taken up by means of gibs and set screws. The table is raised and lowered by means of the large crank handle shown in cut, an indicator on one side of frame showing the exact thickness the machine is set to plane.

The cylinder is double belted, having a pulley at both ends. It is made of the very best forged steel, with extra large journals, which run in extra long self-oiling boxes, lined with the best babbitt and provided with improved oil wells and oil cups.

Both pressure bars work very slow to the knives, and are adjustable to the timber independently of each other and the feed rolls, thus insuring steadiness, even when planing very short and thin stuff. The pressure bars are self-adjusting, always registering themselves to the various sizes of thick and thin lumber being planed.

The feed is driven from the cylinder, and is instantly stopped or started by means of the belt tightener. The bed consists of four large steel rolls. The lower rolls extend the full width of bed, having their bearings in placed ways in the frame. Feed gearing is very powerful, the roll gears being connected by our improved yoke, keeping the gears in perfect mesh at all times and insuring a steady and positive feed. The feed rolls are set as close to the cylinder as possible and arranged to hold the board firmly to the bed.

The upper in-feeding roll is fluted and is held down by counterbalancing levers and weights, and the out-feeding roll is held down by large coiled steel springs, making a strong and positive feed. There are two changes of feed, fast and slow. The light and heavy rollers are 17" x 6", and should make 1,500 revolutions per minute. Weight, 2,000 lbs.

SINGLE SURFACERS.

NOS. 3 AND 3½ SURFACE PLANING MACHINE.

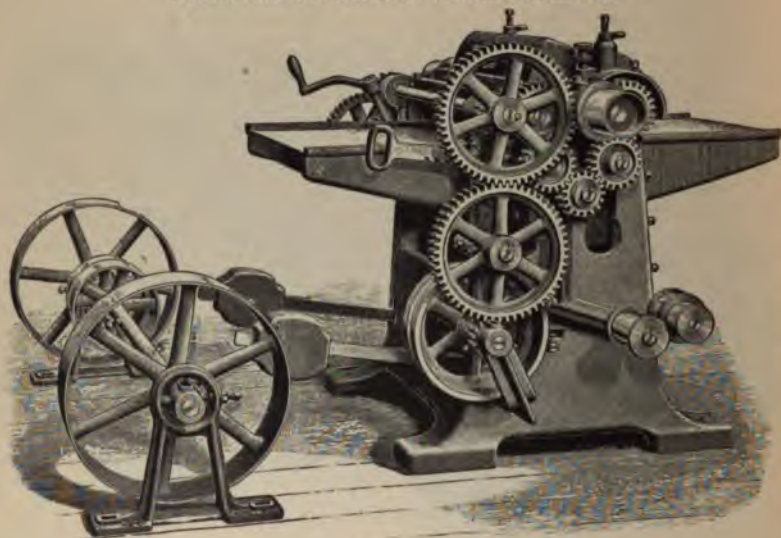


FIG. 12193.

DESCRIPTION FIG. 12193.

The cut shown herewith represents our newly designed Nos. 3 and 3½ surfacer and planer, to plane 24¼" and 26¼" wide and from ½" to 8" thick on hard or soft wood, which, for smooth planing, strong and fast feeding, and excellence of design and workmanship, is not surpassed by any machine of its class.

The frame is cast in one piece, wide at the base, very heavy, and of great strength and solidity.

The table or bed is also cast in one piece, planed perfectly smooth and true, and is dove-tailed into the frame, with extra long bearings, as wide apart as the width of frame will allow, making the table as steady as if it and the frame were cast in one piece. Any wear can be instantly taken up by means of gibs and set screws. The table is raised and lowered by means of the large crank handle shown in cut, an indicator on side of frame showing the exact thickness the machine is set to plane.

The cylinder is double-belted, having a pulley at both ends. It is made of the very best forged steel, with extra large journals, which run in extra long self-oiling boxes, lined with the best labbitt and provided with improved oil well and oil cups.

Both pressure bars work very close to the knives, and are adjustable to the timber independently of each other and the feed rolls, thus insuring steadiness, even when planing very short and thin stuff. The pressure bars are self-adjusting, always regulating themselves to the various sizes of thick and thin lumber being planed.

The feed is driven from the cylinder, and is instantly stopped or started by means of the belt tightener. The feed consists of four large steel rolls, all of which are powerfully geared. The lower rolls extend the full width of bed, having their bearings in planed ways in the frame. Feed gearing is very powerful, the roll gears being connected by our improved yoke, keeping the gears in perfect mesh at all times and insuring a steady and positive feed. The feed rolls are set as close to the cylinder as possible and arranged to hold the board firmly to the bed.

The upper in-feeding roll is fluted and is held down by connected levers and weights, and the out-feeding roll is held down by large coiled steel springs, making a strong and positive feed. There are two changes of feed, fast and slow. The tight and loose pulleys are 10" x 6", and should make 1,050 revolutions per minute.

Weight: No. 3, 24¼" x 8" machine, 2,300 lbs. No. 3½, 26¼" x 8" machine, 2,500 lbs.

SINGLE SURFACERS.

SINGLE SURFACE ENDLESS BED PLANING MACHINE.



FIG. 12194.

DESCRIPTION FIG. 12194.

These machines are very heavy, carefully built of the best materials, strong throughout, and with simple and easy adjustments. They are made for hard work and plenty of it. They are adapted for work in shipyards, car shops, and lumber mills of all descriptions, and are largely in use for milling box lumber. They hold the record for production over any machine in the market.

The cutter cylinders are made from forged crucible steel, carefully and exactly balanced. The sectional feeding-in rolls are separately adjusted so that six pieces of stock varying in thickness can be planed at one time. The bed is raised and lowered on inclines and, if desired, by power attachment, a most valuable feature for job shops where changes are frequent. The machine will plane stock up to 8" in thickness.

This machine is built in two sizes, 26" and 30". Furnished complete with one set of knives, wrenches, and countershaft. Machine skidded for rail shipment; partially knocked down and boxed for ocean shipment. Boxing charged extra at cost.

SPECIFICATIONS.

Machines.	Shipping Weight.	T. and L. Rollers.	Speed.	Power.	Flow
Endless bed.....	6,900 lbs.	14" diameter, 8" face	850	12 horse	
Endless bed.....	7,100 lbs.	14" diameter 8" face	850	11	

DOUBLE SURFACERS.

FOUR ROLL DOUBLE SURFACE PLANER.



FIG. 12195.

DESCRIPTION FIG. 12195.

This machine is adapted to all kinds of surface planing, leaving a coarse or fine finish, according to the feed used. It is especially suited for dressing box lumber, and is often called the box-board planer. It can be used either as a single or double surfer. The machine is heavy and strong, and in every way substantial and satisfactory.

The cutter cylinders are made from forged crucible steel with long bearings, slotted and carefully balanced, and carry four cutters. They are located close together between the feed-in and feed-out rolls. The upper cylinder and housings are held firmly at all points of thickness up to 4". The lower cylinder is adjustable for regulating the depth of cut, and may be lowered below the line of the main bed when the upper cylinder only is used. Each cylinder is driven by two belts, insuring ample power and even work.

The adjustments are all easily made, and efficient means provided for keeping the adjustments rigid when made. The feed-out rolls are mounted on an independent frame which may be swung to one side, affording easy access to the cylinders and housings, and facilitating care and adjustment.

The capacity of the machine is 24" wide by 4" thick.

Machines skidded for all rail shipment; partially knocked down and boxed for ocean shipment. Boxing charged extra at cost.

Machine	Shipping Weight	T. and L. Pulleys	Speed	Power	Flare Beam
4-roll double surface planer.....	4,100 lbs.	12" diameter, 6" face	1,000	10 horse-power	10' x 9"

NO. 9 DOUBLE SURFACER.



FIG. 12196.

DESCRIPTION FIG. 12196.

This machine will plane 26" wide by 8" thick.

Intended for all classes of surfacing, single or double, light or heavy, fast or slow. It is a machine that has no superior if an equal. Especially adapted for box factories or mills dressing lumber in car lots.

Feed Works.—Six powerful, internal geared rolls, geared at both ends and strongly driven. Built with divided in-feeding rolls or solid rolls as desired, also as a six-roll or four-roll, double or single surfer. Has three rates of feed, viz.: 40, 65, and 75 linear feet per minute. Try one and you will use no other.

DOUBLE SURFACERS.

DESCRIPTION FIG. 12196.—Continued.

Cylinders four-slotted, of best crucible steel, arbors in journals $2\frac{1}{4}$ " diameter, lower cylinder drawn out for sharpening or replacing knives.

We furnish with each machine shaving hoods for connection with conductor pipes, one pair of knives for each cylinder and necessary wrenches.

SPECIFICATIONS.

	T. and L. Pulleys.	Revolutions per Minute.	Cubic Measure.	Approximate Weight.
No. 9A-1, 26" x 8", six roll double surfacer, divided in-feeding rolls.....	12" x 8"	900	243	8,200 lbs.
No. 9A-2, 26" x 8", six roll single surfacer, divided in-feeding rolls.....	12" x 8"	900	243	8,000 lbs.
No. 9B-1, 26" x 8", six roll double surfacer, solid in-feeding rolls.....	12" x 8"	900	243	7,900 lbs.
No. 9B-2, 26" x 8", six roll single surfacer, solid in-feeding rolls.....	12" x 8"	900	243	7,700 lbs.
No. 10A-1, 26" x 8", four roll double surfacer, divided in-feeding roll.....	12" x 8"	900	243	7,400 lbs.
No. 10A-2, 26" x 8", four roll single surfacer, divided in-feeding roll.....	12" x 8"	900	243	7,200 lbs.
No. 10B-1, 26" x 8", four roll double surfacer, solid in-feeding roll.....	12" x 8"	900	243	7,250 lbs.
No. 10B-2, 26" x 8", four roll single surfacer, solid in-feeding roll.....	12" x 8"	900	243	7,050 lbs.

NO. 15 DOUBLE PLANER AND MATCHER.



FIG. 12197.

DESCRIPTION FIG. 12197.

Flange 24" wide by 8" thick, and will match 19" wide.

This machine is designed for surfacing, working flooring, beaded ceiling, novelty siding, battens, moldings, etc. A strong feeding, durable planer and matcher, bed having a vertical movement.

Extra molding arbor. This consists of an extra crucible steel arbor and frame placed in rear of matcher heads. This molding arbor has three bearings, and a four-slotted head 9" long, and on this head, molding, German or novelty siding, beading, beveling, and other shaped knives can be placed, insuring a perfect finish for this class of material. This molding arbor can be omitted when desired, but it will be found a very useful and convenient attachment.

Built also as a single planer and matcher, if desired.

We furnish with each machine: Two 24" knives for each cutter head, a full set of steel bolts with case-hardened nuts for the opposite sides of the surfacing heads, one pair of mortised steel matcher heads, four solid matcher bits for working flooring, one pair novelty siding knives, one pair beading bits and necessary wrenches. Slotted jointer heads or Shimer patent matcher heads, extra.

Description continued on following page.

DOUBLE SURFACERS.

FOUR ROLL DOUBLE SURFACE PLANER.



FIG. 12195.

DESCRIPTION FIG. 12195.

This machine is adapted to all kinds of surface planing, leaving a coarse or fine finish, according to the feed used. It is especially suited for dressing box lumber, and is often called the box-board planer. It can be used either as a single or double surfacer. The machine is heavy and strong, and in every way substantial and satisfactory.

The cutter cylinders are made from forged crucible steel with long bearings, slotted and carefully balanced, and carry four cutters. They are located close together between the feed-in and feed-out rolls. The upper cylinder and housings are held firmly at all points of thickness up to 4". The lower cylinder is adjustable for regulating the depth of cut, and may be lowered below the line of the main bed when the upper cylinder only is used. Each cylinder is driven by two belts, insuring ample power and even work.

The adjustments are all easily made, and efficient means provided for keeping the adjustments rigid when made. The feed-out rolls are mounted on an independent frame which may be swung to one side, affording easy access to the cylinders and housings, and facilitating care and adjustment.

The capacity of the machine is 24" wide by 4" thick.

Machines skidded for all rail shipment; partially knocked down and boxed for ocean shipment. Boxing charged extra at cost.

Machine.	Shipping Weights.	T. and L. Pulleys.	Speed.	Power.	Floor Space.
4-roll double surface planer	4,100 lbs.	12" diameter, 6" face	1,000	10 horse-power	10' x 6'

NO. 9 DOUBLE SURFACER.

GEARED SIDE.



FIG. 12196.

DESCRIPTION FIG. 12196.

This machine will plane 26" wide by 8" thick.

Intended for all classes of surfacing, single or double, light or heavy, fast or slow. It is a machine that has no superior if an equal. Especially adapted for box factories or mills dressing lumber in car lots.

Feed Works.—Six powerful, internal geared rolls, geared at both ends and strongly driven. Built with divided in-feeding rolls or solid rolls as desired, also as a six-roll or four-roll, double or single surfacer. Has three rates of feed, viz.: 40, 65, and 75 linear feet per minute. Try one and you will use no other.

DOUBLE SURFACERS.

DESCRIPTION FIG. 12196.—Continued.

Cylinders four-slotted, of best crucible steel, arbors in journals $2\frac{1}{4}$ " diameter, lower cylinder drawn out for sharpening or replacing knives.

We furnish with each machine shaving hoods for connection with conductor pipes, one pair of knives for each cylinder and necessary wrenches.

SPECIFICATIONS.

	T. and L. Pulleys	Revolutions per Minute.	Cubic Measure.	Approximate Weight.
No. 9A-1, 26" x 8", six roll double surfer, divided in-feeding rolls.....	12" x 8"	900	243	8,200 lbs.
No. 9A-2, 26" x 8", six roll single surfer, divided in-feeding rolls.....	12" x 8"	900	243	8,000 lbs.
No. 9B-1, 26" x 8", six roll double surfer, solid in-feeding rolls.....	12" x 8"	900	243	7,900 lbs.
No. 9B-2, 26" x 8", six roll single surfer, solid in-feeding rolls.....	12" x 8"	900	243	7,700 lbs.
No. 10A-1, 26" x 8", four roll double surfer, divided in-feeding roll.....	12" x 8"	900	243	7,400 lbs.
No. 10A-2, 26" x 8", four roll single surfer, divided in-feeding roll.....	12" x 8"	900	243	7,200 lbs.
No. 10B-1, 26" x 8", four roll double surfer, solid in-feeding roll.....	12" x 8"	900	243	7,250 lbs.
No. 10B-2, 26" x 8", four roll single surfer, solid in-feeding roll.....	12" x 8"	900	243	7,050 lbs.

NO. 15 DOUBLE PLANER AND MATCHER.



FIG. 12197.

DESCRIPTION FIG. 12197.

Planes 24" wide by 8" thick, and will match 19" wide.

This machine is designed for surfacing, working flooring, beaded ceiling, novelty siding, battens, moldings, etc. A strong feeding, durable planer and matcher, bed having a vertical movement.

Extra molding arbor. This consists of an extra crucible steel arbor and frame placed in rear of matcher heads. This molding arbor has three bearings, and a four-slotted head 8" long, and on this head, molding, German or novelty siding, beading, beveling, and other shaped knives can be placed, insuring a perfect finish for this class of material. This molding arbor can be omitted when desired, but it will be found a very useful and convenient attachment.

Built also as a single planer and matcher, if desired.

We furnish with each machine: Two 24" knives for each cutter head, a full set of steel bolts with case-hardened nuts for the opposite sides of the surfacing heads, one pair of mortised steel matcher heads, four solid matcher bits for working flooring, one pair novelty siding knives, one pair beading bits and necessary wrenches. Slotted jointer heads or Shimer patent matcher heads, extra.

Description continued on following page.

DOUBLE SURFACERS.

FOUR ROLL DOUBLE SURFACE PLANER.



FIG. 12195.

DESCRIPTION FIG. 12195.

This machine is adapted to all kinds of surface planing, leaving a coarse or fine finish, according to the feed used. It is especially suited for dressing box lumber, and is often called the box-board planer. It can be used either as a single or double surfer. The machine is heavy and strong, and in every way substantial and satisfactory.

The cutter cylinders are made from forged crucible steel with long bearings, slotted and carefully balanced, and carry four cutters. They are located close together between the feed-in and feed-out rolls. The upper cylinder and housings are held firmly at all points of thickness up to 4". The lower cylinder is adjustable for regulating the depth of cut, and may be lowered below the line of the main bed when the upper cylinder only is used. Each cylinder is driven by two belts, insuring ample power and even work.

The adjustments are all easily made, and efficient means provided for keeping the adjustments rigid when made. The feed-out rolls are mounted on an independent frame which may be swung to one side, affording easy access to the cylinders and housings, and facilitating care and adjustment.

The capacity of the machine is 24" wide by 4" thick.

Machines skidded for all rail shipment; partially knocked down and boxed for ocean shipment. Boxing charged extra at cost.

Machine.	Shipping Weight.	T. and L. Pulleys.	Speed.	Power.	Floor Foot Print.
4-roll double surface planer.....	4,100 lbs.	12" diameter, 6" face	1,000	10 horse-power	10' x 6'

NO. 9 DOUBLE SURFACER.

GEARED SIDE.



FIG. 12196.

DESCRIPTION FIG. 12196.

This machine will plane 26" wide by 8" thick.

Intended for all classes of surfacing, single or double, light or heavy, fast or slow. It is a machine that has no superior if an equal. Especially adapted for box factories or mills dressing lumber in car lots.

Feed Works.—Six powerful, internal geared rolls, geared at both ends and strongly driven. Built with divided in-feeding rolls or solid rolls as desired, also as a six-roll or four-roll, double or single surfer. Has three rates of feed, viz.: 40, 65, and 75 linear feet per minute. Try one and you will use no other.

DOUBLE SURFACERS.

DESCRIPTION FIG. 12196.—Continued.

Cylinders four-slotted, of best crucible steel, arbors in journals $2\frac{1}{4}$ " diameter, lower cylinder drawn out for sharpening or replacing knives.

We furnish with each machine shaving hoods for connection with conductor pipes, one pair of knives for each cylinder and necessary wrenches.

SPECIFICATIONS.

	T. and L. Pulleys	Revolutions per Minute.	Cubic Measure.	Approximate Weight.
No. 9A-1, 26" x 8", six roll double surfacer, divided in-feeding rolls.....	12" x 8"	900	243	8,200 lbs.
No. 9A-2, 26" x 8", six roll single surfacer, divided in-feeding rolls.....	12" x 8"	900	243	8,000 lbs.
No. 9B-1, 26" x 8", six roll double surfacer, solid in-feeding rolls.....	12" x 8"	900	243	7,900 lbs.
No. 9B-2, 26" x 8", six roll single surfacer, solid in-feeding rolls.....	12" x 8"	900	243	7,700 lbs.
No. 10A-1, 26" x 8", four roll double surfacer, divided in-feeding roll.....	12" x 8"	900	243	7,400 lbs.
No. 10A-2, 26" x 8", four roll single surfacer, divided in-feeding roll.....	12" x 8"	900	243	7,200 lbs.
No. 10B-1, 26" x 8", four roll double surfacer, solid in-feeding roll.....	12" x 8"	900	243	7,250 lbs.
No. 10B-2, 26" x 8", four roll single surfacer, solid in-feeding roll.....	12" x 8"	900	243	7,050 lbs.

NO. 15 DOUBLE PLANER AND MATCHER.



FIG. 12197.

DESCRIPTION FIG. 12197.

Planes 24" wide by 8" thick, and will match 19" wide.

This machine is designed for surfacing, working flooring, beaded ceiling, novelty siding, battens, moldings, etc. A strong feeding, durable planer and matcher, bed having a vertical movement.

Extra molding arbor. This consists of an extra crucible steel arbor and frame placed in rear of matcher heads. This molding arbor has three bearings, and a four-slotted head 8" long, and on this head, molding, German or novelty siding, beading, beveling, and other shaped knives can be placed, insuring a perfect finish for this class of material. This molding arbor can be omitted when desired, but it will be found a very useful and convenient attachment.

Built also as a single planer and matcher, if desired.

We furnish with each machine: Two 24" knives for each cutter head, a full set of steel bolts with case-hardened nuts for the opposite sides of the surfacing heads, one pair of mortised steel matcher heads, four solid matcher bits for working flooring, one pair novelty siding knives, one pair beading bits and necessary wrenches. Slotted jointer heads or Shimer patent matcher heads, extra.

Description continued on following page.

DOUBLE SURFACERS.

DESCRIPTION FIG. 12197.—Continued.

	Tight and Loose Pulleys.	R.P.M.	Cubic Measure.	Approx. Weight.	Average H. P.
No. 15A, four-roll double planer and matcher, planes 24" x 8", including extra molding arbor.....	12" x 8"	900	190	4,850 lbs.	4 to 6
No. 15B, four-roll double planer and matcher, planes 24" x 8", without extra molding arbor.....	12" x 8"	900	190	4,700 lbs.	4 to 6
No. 15C, four-roll three-sided planer and matcher, planes 24" x 8", including extra molding arbor.....	12" x 8"	900	190	4,400 lbs.	4 to 6
No. 15D, four-roll three-sided planer and matcher, planes 24" x 8", without the extra molding arbor.....	12" x 8"	900	190	4,250 lbs.	4 to 6

NO. 12 FOUR ROLL DOUBLE PLANER AND MATCHER.

FRONT VIEW.



FIG. 12198.

DESCRIPTION FIG. 12198.

A heavy internal geared, powerful feeding planer and matcher, designed for light or heavy work.

It will surface 26" wide on two sides up to 8" thick without removing the side spindles and will match from 1½" up to 23" wide. It will joint four sides from 1¼" to 23" wide and from ¼" to 6" thick.

Feed Works.—Has four powerfully driven internal geared feed rolls 7" in diameter, two in feeding and two delivery rolls at rear of under cylinder.

In the divided roll machine, the top in-feeding roll is in two sections and is driven separately at each side of the machine, and is so arranged that it will act as a solid roll, yet each section will yield independently of the other so that two pieces of lumber of different thickness, varying from ½" to 1", may be fed at once and each section will have an even pressure on each piece.

The Cylinders.—The top cylinder is double-belted, the bottom cylinder is single-belted and both are made from hammered crucible steel forgings, slotted four sides, and knives are interchangeable. The journals both top and bottom are 2¼" in diameter and run in long self-oiling boxes. The under cylinder and throat plate back of it are adjustable.

The chip breaker and pressure bars work in connection with the divided roll and are both adjustable sufficiently to allow knives to be extended 2" from the cutting diameter of the head.

DOUBLE SURFACERS.

DESCRIPTION FIG. 12188.—Continued.

The pressure bar over the under head is strong and substantially made, and by loosening one bolt may be thrown up out of the way and free access may be had for filing or placing new knives on the under cutter. When placed back in position it is as solid as if it were cast to the frame.

The matcher head spindles are of best crucible steel, large in diameter, run in self-oiling boxes and can be moved across the machine in one-half the time of any other machine made. (Patented January 26, 1904.) This idea is new and saves time.

There are three rates of feed, viz.: 40, 65, and 75 linear feet per minute.

Each machine is furnished with shaving hoods arranged for connection with conductor pipes, two knives for each cylinder, one pair of Shimer patent matcher heads, one pair of four slotted jointing heads 6' long, two knives for each jointing head, and necessary wrenches.

SPECIFICATIONS.

	T. and L. Pulleys.	Revolutions per Minute.	Cylinder Measure.	Approximate Weight.
No. 12A-1, 26" x 8", four roll double planer and matcher, divided in-feeding roll.....	12" x 8"	900	241	7,350 lbs.
No. 12A-2, 26" x 8", four roll single planer and matcher, divided in-feeding roll.....	12" x 8"	900	241	7,150 lbs.
No. 12B-1, 26" x 8", four roll double planer and matcher, solid in-feeding roll.....	12" x 8"	900	241	7,250 lbs.
No. 12B-2, 26" x 8", four roll single planer and matcher, solid in-feeding roll.....	12" x 8"	900	241	7,050 lbs.

NO. 11 SIX ROLL DOUBLE PLANER AND MATCHER.

FRONT VIEW.



FIG. 12199.

REAR VIEW.



FIG. 12200.

DESCRIPTION FIGS. 12199 AND 12200.

A new heavy internal geared powerful feeding planer and matcher designed for light or heavy work and lots of it.

It will surface 26" wide on two sides up to 8" thick without removing the side spindles and will match from 1½" up to 30" wide.

It will joint four sides from 1¼" to 23" wide and from ¼" to 6" thick.

Feed works.—Has six powerfully driven internal geared feed rolls 7" in diameter, four in feeding and two delivery rolls at rear of under cylinder.

In the divided roll machine the top in-feeding rolls are in two sections and are driven separately at each side of the machine and are so arranged that they act as a solid roll, yet each section will yield independently of the other, so that two pieces of lumber of different thickness varying from ½" to 1" may be fed at once and each section will have an even pressure on each piece.

The cylinders—top and bottom—are double bevel and are made from hammered crucible steel forgings, drilled four sides and barrels are interchangeable. The journals, both top and bottom, are 2½" in diameter and run in long self-oiling boxes. Under cylinder and throat plate back of it are adjustable.

The chip breaker and pressure bar work in connection with the divided rolls and both are adjustable sufficiently to allow knives to be extended 2" from the cutting diameter of the head.

The pressure bar over the under head is strong and substantially made and by loosening one bolt may be thrown up out of the way and free access may be had for filing or placing new knives in the under cutter. When placed back in position it is as solid as if it were cast to the frame.

DOUBLE SURFACERS.

DESCRIPTION FIGS. 12199 AND 12200.—Continued.

The matcher head spindles are of best crucible steel, large in diameter, run in self-oiling boxes, and can be moved across the machine in one-half the time of any other machine made. (Patented January 26, 1904.) This idea is new and saves time.

There are three rates of feed, viz.: 40, 65, and 75 linear feet per minute. Each machine is furnished with shaving heads arranged for connection with conductor pipes, two knives for each cylinder. One pair Shimer patent matcher heads, one pair four-slotted jointing heads 6" long, two knives for each jointing head, and necessary wrenches.

SPECIFICATIONS.

	T. and L. Pulleys.	Revolutions per Minute.	Cubic Measure.	Approximate Weight.
No. 11A-1, 26" x 8", six-roll double planer and matcher, divided in-feeding rolls.....	12" x 8"	900	265	8,350 lbs.
No. 11A-2, 26" x 8", six-roll single planer and matcher, divided in-feeding rolls.....	12" x 8"	900	265	8,150 lbs.
No. 11B-1, 26" x 8", six-roll double planer and matcher, solid in-feeding rolls.....	12" x 8"	900	265	8,250 lbs.
No. 11B-2, 26" x 8", six-roll single planer and matcher, solid in-feeding rolls.....	12" x 8"	900	265	8,050 lbs.

ENDLESS BED DOUBLE SURFACE PLANING MACHINE.



FIG. 12201.

DESCRIPTION FIG. 12201.

These machines are very heavy, carefully built of the best materials, strong throughout, and with simple and easy adjustments. They are made for hard work and plenty of it. They are adapted for work in shipyards, car shops, and lumber mills of all descriptions, and are largely in use for milling box lumber. They hold the record for production over any machine in the market.

The cutter cylinders are made from forged crucible steel, carefully and exactly balanced. The upper cylinder has pneumatic pulleys at both ends; the lower cylinder at one end only. The sectional feeding-in rolls are separately weighted so that six pieces of stock varying in thickness can be planed at one time. The bed is raised and lowered on inclines, and, when desired, by power, a most valuable feature for job shops where changes are frequent. The lags of the endless bed are carefully guarded, and both lags and links easily removed and renewed. The machine will plane stock $\frac{3}{8}$ " to 8" in thickness.

The machine is built in two sizes, 26" and 30". Furnished complete with one set knives, wrenches, and countershaft.

SPECIFICATIONS.

Machine.	Shipping Weight.	T. and L. Pulleys.	Speed.	Power.	Floor Base.
26" endless bed.....	6,900 lbs.	14" diameter, 8" face	850	10 horse-power	10 $\frac{1}{2}$ " x 6 $\frac{1}{4}$ "
30" endless bed.....	7,100 lbs.	14" diameter, 8" face	850	12 horse-power	10 $\frac{1}{2}$ " x 7"

MAY 1900 C. S. M. & Y. B. H. F. B. E. T.

PANEL RAISER.

DESCRIPTION FIG. 12202.

This machine is used for raising panels of any style, width or thickness. The heads may be inclined to any angle and adjusted to and from the work without disturbing the angle; both table and guide are adjustable; the cutters make a drawing cut and produce smooth, clean work.

This machine is furnished for either hand or self-feed.

The tight and loose pulleys are 9" diameter, 4" face, and should make 1,000 revolutions per minute.

Hand-feed machine, weight 700 lbs.
Self-feed machine, weight 800 lbs.

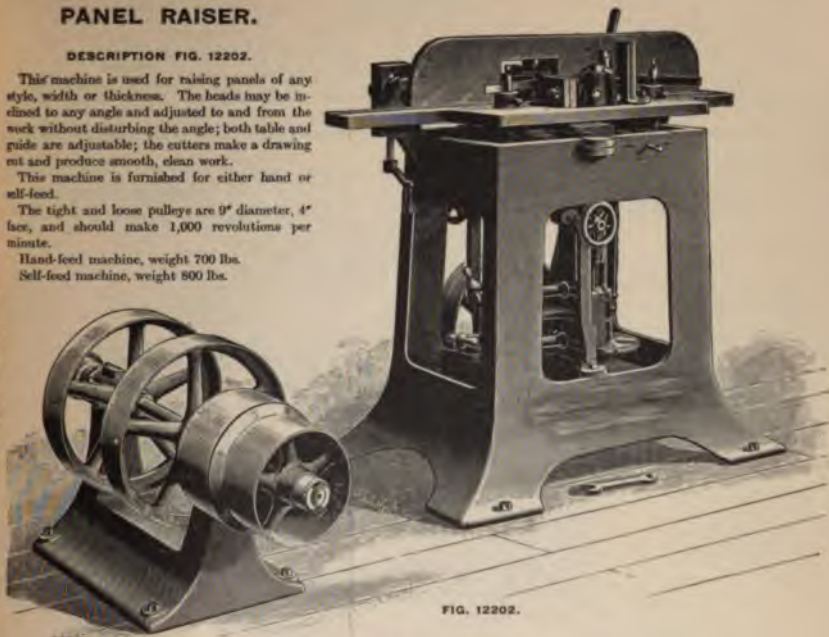


FIG. 12202.

SINGLE SPINDLE SHAPER.

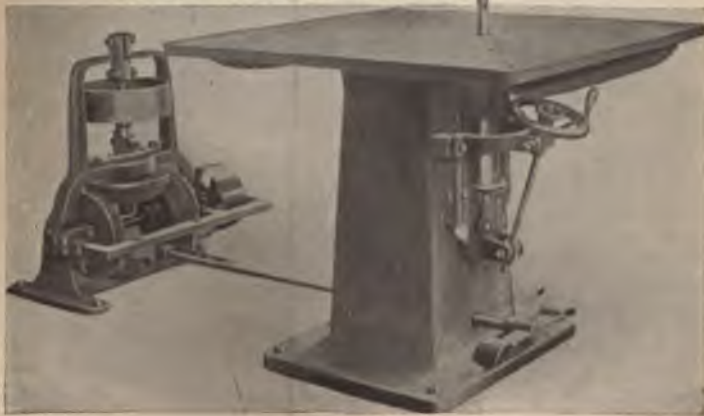


FIG. 12203.

Description on following page.

SHAPERS.

DESCRIPTION FIG. 12203.

The engraving, Fig. 12203, represents a new single spindle shaper, with friction reverse countershaft. The spindle is reversed by foot treadle, the counter is entirely noiseless, strong and simple, and not liable to get out of order. $3\frac{1}{8}$ " and $3\frac{1}{2}$ " spindles are furnished with the machine. The table is of hard wood, glued up in narrow strips. Driving pulley 9" in diameter, 4" face, and should make 1,100 revolutions per minute.

Weight, 800 lbs.

TWO SPINDLE SHAPER.



FIG. 12204.

DESCRIPTION FIG. 12204.

This engraving represents a new double spindle shaper. The frame is cast entire, with large base. The guides for spindle frames are cast with pedestal; the spindles are of crucible steel and run in long self-lubricating habbitted boxes and are placed 24" apart between centers, and provided with two circular plates let into the table and surrounding the spindles. Either spindle can be lowered below the surface of the table. The table is of iron, 54" long in front of machine by 44" wide. A closet for tools is within the column. Two sets of collars for cutters are furnished. Weight, 1,300 lbs. Tight and loose pulleys are 10" diameter by 5" face, and should make 1,000 revolutions per minute.

SHAPERS.

NO. 4 DOUBLE SPINDLE UPRIGHT SHAPING MACHINE.

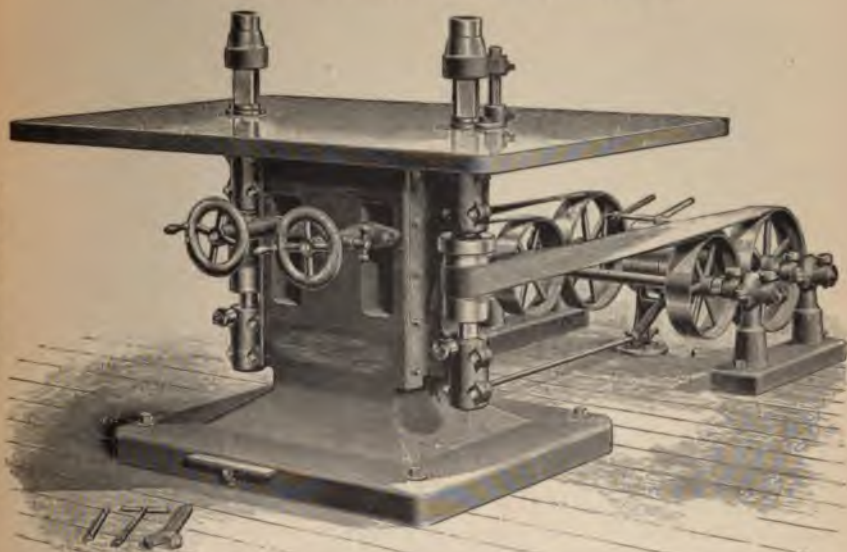


FIG. 12205.

Net Weight, 2,000 lbs.

DESCRIPTION FIG. 12205.

This engraving represents our improved No. 4 heavy double spindle upright shaping machine, which has been designed for shaping irregular forms; it is massive and heavy and adapted to a large variety of work required in wagon, carriage, agricultural implement, car, and general woodworking shops.

The frame is a substantial casting in one piece, with cored center of sufficient strength to overcome all tendency to twist or spring the bed, and an easy, uncramped movement of the working parts is secured.

The cutter-head spindles, of steel, are 2" diameter, and rotate in heavy bearings, with connected boxes, which are gibbed to the main frame, and they have a vertical adjustment by the use of the hand wheels shown. The spindles are 28" apart from center to center, and they are fitted with one pair of 3" flanged cutter heads with 3" straight-faced knives. Cutters of various sizes and shapes can be used. An improved safety guard covers the top of each head, which prevents the operator from coming in contact with the cutters.

The table, of iron, is cast in one piece and planed true; it is 60" long, 46" wide. An extra table of the same size can be furnished and attached to the rear side of the regular table to accommodate extra long and heavy work.

This machine, when so ordered, can be furnished with wobble saws on the cutter-head spindles, and a sweep attached to the table, which can be adjusted to different circles, to be used for the purpose of dressing the inside and tread of sawed felloes for vehicle wheels. With this attachment, 2,000 felloes can be dressed up square and true in ten hours.

The double countershaft enables the drive belts to properly track over the pulleys, and prevents the belts from jumping or flopping, which secures a smooth speed to the cutters, and enables better work to be obtained.

A convenient foot treadle is used for starting and stopping the machine. The tight and loose pulleys are 10" diameter, 5" face, and should run 1,200 rotations per minute.

Horse-power to drive, 4; floor space occupied, 60" x 96"

MOULDERS.

8" PATENT FOUR-SIDE MOULDER.

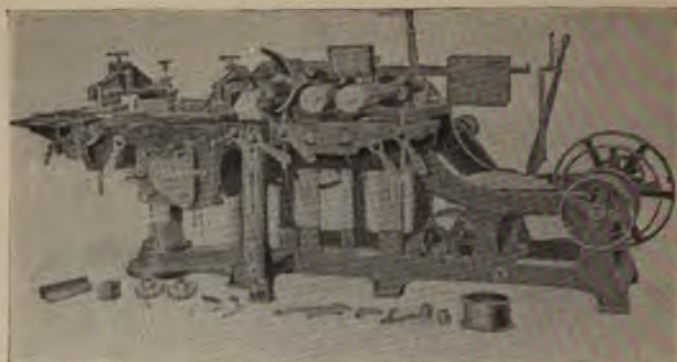


FIG. 12206.

DESCRIPTION FIG. 12206.

The frame is extremely heavy, and being cast in one piece is perfectly stiff, making a solid foundation for all bearings. The heavy octagon column supports the table and under head in a substantial manner.

The heavy outside bearing for the top head is made in two pieces. The lower part is a heavy bracket firmly bolted to the frame and rests on the floor, while the upright is accurately fitted and is adjustable vertically to take up the wear of the end box of the top head. This is an important feature. The boxes on the main frame will wear more than the outside bearing, as they have the direct pull of the belt. By loosening the two screws on the outside bearing near the bottom, the outside bearing will adjust itself to the proper height, and by tightening up the screws it will always be in line. It is also provided with a bolt that passes through the table and frame, assisting to hold the bed firmly in position when set for a certain thickness.

The feed works are heavier and stronger, owing to the extra width of the face of the gearing. There are four feed rolls 6" in diameter, all driven by this heavy gearing, and will feed as strongly when the bed is dropped to its full depth as when working on thinner material. The top feed rolls, which are weighted, rise parallel with the bed and rest their full weight evenly on all parts of the work, insuring a strong positive feed. They are controlled by a binder lever placed close to the operator, which is held in place by a notched bar. By this means the feed belt can be adjusted tightly for heavy work, or more loosely for light work, thus relieving the belt when light work is being done. It has four rates of feed, namely, 21, 31, 39 and 55 lineal feet per minute.

The upper rolls and chip breaker are quickly raised from the work by means of a lever just back of the rolls, as shown in the cut, to admit of the use of a form for setting up the machine on different styles of work. There is an adjustable tightener resting on the top of the belt that drives the top head, by which the strain can be increased or decreased according to the depth of the cut. This is operated by the crank as shown in the end view of the machine.

The top chip breaker rests firmly upon the material, a flexible cushion allowing chip breaker to ride over rough sawed lumber or projections, and preventing the chip breaker from jumping.

The main arbor is 2 $\frac{1}{4}$ " in diameter, and the bearings are long, lined with the best babbit metal, and all belts pull on the bottom of the boxes.

The side heads rise and descend with the table. Both the inside and outside head stocks are adjustable horizontally and vertically. Either spindle can be set at an angle from the front side of the machine, while the machine is in motion, and after being set can be adjusted in or out for a heavy or light cut without changing angle.

By placing the crank on the center stud, either side head stock can be moved out or in at double the speed of any other machine. This device is patented.

MOULDERS.

DESCRIPTION FIG. 12200.—Continued.

The upright head stocks are mounted on heavy cast bars; the front side of the bar carrying the head stock is planed true and on a V shape. The head stocks that slide on these bars are planed to fit. When the head stocks are set to the proper width, a bolt at the back part of the head stock is tightened, thus drawing the head stock up against the V-shaped bars, which makes it as solid as though it were cast to the frame, thus allowing the side heads to do as smooth work as the top head. This is an entirely new feature, and will not be found on any other machine.

The top head has a lateral adjustment; the bottom head has a lateral and vertical adjustment, and is provided with chip breakers front and back of the head. The under head has three bearings, or a bearing outside of the driving pulley.

The distance between the top and bottom heads is less than in the old style machines. Sectional pressure bars are provided over the under head and in rear of the top head. This feature is new on this class of machines. The rear table beyond the under head swings clear to allow convenient access to the knives. Ample space is provided about all heads to admit the use of bits of unusual lengths.

The chip breaker for outside head is weighted and is attached to head stock, moves out and in with it and is self-adjusting. There are adjustable chip breakers on both sides of the bottom head and for the inside head.

We build this machine in six sizes, 7", 8", 9", 10", 12" and 14" wide.

The 7" machine will dress 7" wide by $3\frac{1}{4}$ " thick, on four sides.

The 8" machine will dress 8" wide by $3\frac{1}{4}$ " thick, on four sides.

The 9" machine will dress 9" wide by 4" thick, on four sides.

The 10" machine will dress 10" wide by 4" thick, on four sides.

The 12" machine will dress 12" wide by 4" thick, on four sides.

The 14" machine will dress 14" wide by 4" thick, on four sides and the table on each will descend 12".

Each machine is furnished with four heads, slotted on four sides, two plain knives for each head, one extra four slotted head without knives, extra bolts for all of the four slotted heads, four collars, two extra feed spurs, one extra double flange feed pulley, with necessary wrenches and spring poets and springs, as shown in the cut.

SPECIFICATIONS.

	Tight and Loose Pulleys.	Revolutions per Minute.	Cubic Measurement.	Approximate Weight.	Average Horse-power Required.
14", to work four sides	14" x 10"	850	288'	5,700 lbs.	6 to 12
12", to work four sides	12" x 8"	850	280'	5,450 lbs.	6 to 10
10", to work four sides	12" x 8"	850	272'	5,200 lbs.	6 to 8
9", to work four sides	12" x 8"	850	268'	5,000 lbs.	5 to 7
8", to work four sides	10" x 8"	900	146'	3,450 lbs.	4 $\frac{1}{4}$ to 6
7", to work four sides	10" x 6"	900	140'	3,300 lbs.	3 $\frac{1}{4}$ to 5

Note: By placing crank on center stud, as shown in cut, side heads are moved out or in at double the speed of any other. This feature is patented.

DESCRIPTION FIG. 12207.

This machine can be used as a light four-side moulding machine for making small mouldings, blind slats, etc., and for all kinds of light sticking, such as mah stiles, rails and muntins as well as for general light work of all descriptions that can be done on a 3' moulding machine. We also build it with a plow and boring attachment for making a continuous wide and narrow groove: This attachment consists of an extra table setting at an incline, an arbor carrying two Shimer patent grooving heads (one for making the wide groove, the second head for making the narrow groove), and two adjustable fences, also a boring arbor which is operated by a foot treadle.

The double grooving and boring attachment, which is placed on the No. 3 A, B, C and D machines, is operated as follows: The stile is placed on the inclined grooving table and pushed forward against a stop, making the wide groove, the foot is then placed on the treadle and it is bored at an incline for the knot on the mah case, the stile is then placed against the second fence and pushed forward against the stop, which makes the narrow groove connecting the wider groove with the hole that has been bored. The two stops are adjustable for different lengths of grooving. The stile is then run through the machine in the usual way. An ordinary operator can bore and groove the stiles as fast as they can be run through the machine, keeping it in continuous operation.

The No. 3 E, F, G, H and K machines are built with a single plow and boring attachment. In this machine the incline table is not so wide; it is provided with one Shimer patent grooving head and two stops. The stile is placed on the incline grooving table and pushed forward against a counterbalanced stop, the stile is then bored by placing the foot on the treadle, which trips the counterbalance and the first stop drops below the table when the stile is pushed forward against the second stop, completing the groove up to the hole. The hole is bored at an angle so that the knot in the end will draw to the bottom of the hole.

NO. 3 SASH STICKER.

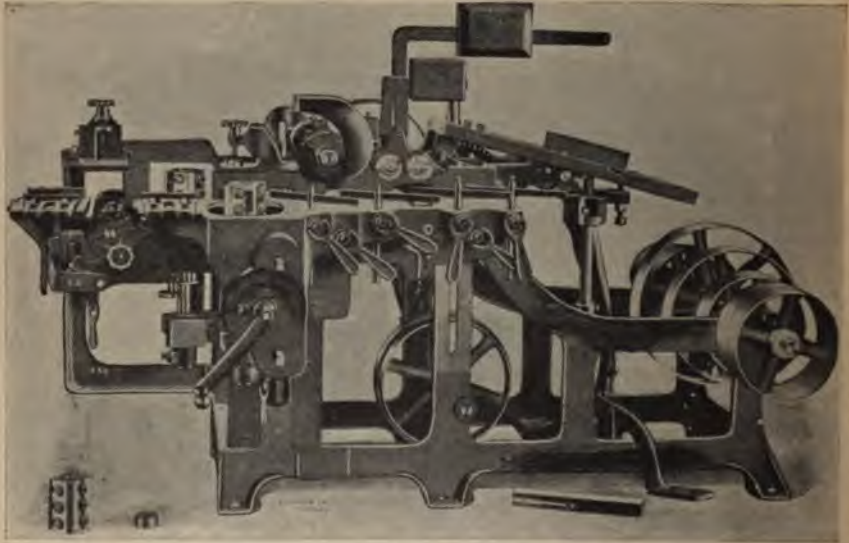


FIG. 12207.

DESCRIPTION FIG. 12207.—Continued.

This machine is built either one, two, three or four sides as desired and either with or without the double grooving and boring attachment for making the continuous wide and narrow groove, or with the single plow and boring attachment as above described.

We furnish with each machine: One cap head on top arbor, one four-slotted head for each side arbor and the rear bottom arbor, one set of sash cutters, one bit $\frac{3}{4}$ " diameter, two patent Shimer grooving heads for the double grooving and boring attachment or one Shimer patent grooving head for the single plow and boring attachment and necessary wrenches.

SPECIFICATIONS.

	Approximate Weight.	Cubic Measurement.
No. 3A, with top head and double grooving and boring attachment.....	1,500 lbs.	95'
No. 3B, with top and rear bottom heads and double grooving and boring attachment.....	1,600 lbs.	95'
No. 3C, with top, rear bottom and outside heads and double grooving and boring attachment.....	1,750 lbs.	95'
No. 3D, with top, rear bottom and outside and inside heads and double grooving and boring attachment.....	1,850 lbs.	95'
No. 3E, with top head and single plow and boring attachment.....	1,450 lbs.	95'
No. 3F, with top and rear bottom heads and single plow and boring attachment.....	1,550 lbs.	95'
No. 3G, with top and outside heads and single plow and boring attachment.....	1,550 lbs.	95'
No. 3H, with top, rear bottom and outside heads and single plow and boring attachment.....	1,650 lbs.	95'
No. 3I, with top, rear bottom and outside and inside heads and single plow and boring attachment.....	1,700 lbs.	95'

Tight and loose pulleys, 10' x 5'.

Revolutions per minute, 900.

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MORTISING MACHINES.

DESCRIPTION FIG. 12208.

This is a light but substantial and durable machine, complete in itself, and can be moved from place to place in the shop as needed. It is well adapted to the manufacture of doors, sash, and blinds, and other kinds of light work. It is made entirely of iron and steel in a first-class manner, and stands firmly upon its feet when in use.

POWER MORTISING MACHINE.



FIG. 12209.

Machine.
Power mortising machine.

Shipping Weight.
2,100 lbs.

SPECIFICATIONS.
T. and L. Pulleys.
12" diameter, 4" face

Speed.
360

Power.
1 horse-power

Floor Space.
3' x 4'

Care should be taken not to strain the counter spring tighter than is necessary to draw out the chisel, and when not in use the spring may be loosened so as not to destroy its elasticity. The loop which connects the trestle with the chisel block may be moved forward or backward to govern the depth of the mortise, or the power of the trestles.

Five chisels are supplied with the machine, viz.: $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", and $\frac{1}{4}$ ".

The shipping weight of the machine is 250 lbs. Floor space, 2' 6" x 2' 8".

FOOT MORTISING MACHINE.



FIG. 12208.

DESCRIPTION FIG. 12209.

This machine is adapted to all ordinary work, and will bore and mortise all kinds of hard and soft wood of any size up to 12" deep and 8" wide.

The chisel has a stroke of 5". The pedestal has a wide reach, the column is hollow, giving great rigidity.

The reversing mechanism is very simple but accurate in its operation. The wearing parts are made of steel and hardened. There is an adjustable stop for the trestle, limiting its upward movement as desired. The rest is readily raised or lowered, and may be set at any angle desired. The balance weight is inside the column, holding the bearings firm and limiting vibration. The boring shaft is belted direct from the countershaft, which is furnished with the machine. There are also supplied with the machine one each augur bits and chisels of the following sizes: $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ ", and 1".

NO. 3 SASH STICKER.

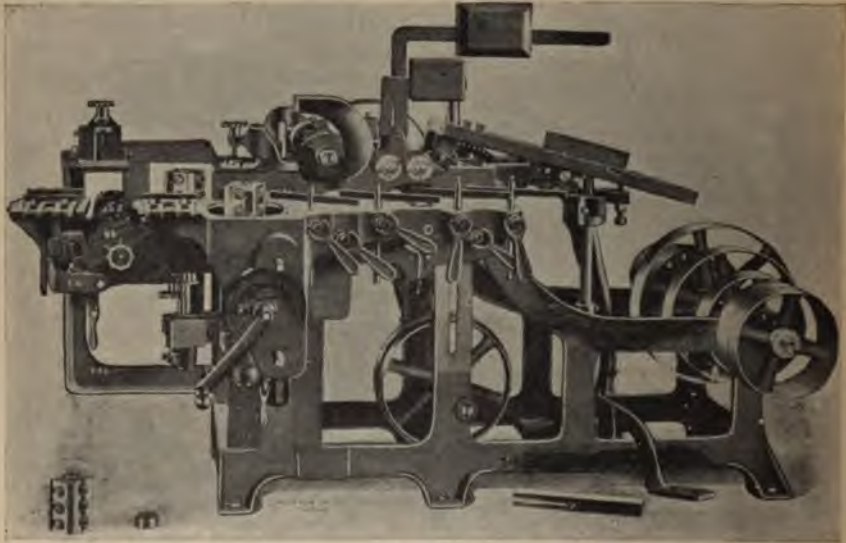


FIG. 12207.

DESCRIPTION FIG. 12207.—Continued.

This machine is built either one, two, three or four sides as desired and either with or without the double grooving and boring attachment for making the continuous wide and narrow groove, or with the single plow and boring attachment as above described.

We furnish with each machine: One cap head on top arbor, one four-slotted head for each side arbor and the rear bottom arbor, one set of sash cutters, one bitt $\frac{3}{4}$ " diameter, two patent Shimer grooving heads for the double grooving and boring attachment or one Shimer patent grooving head for the single plow and boring attachment and necessary wrenches.

SPECIFICATIONS.

	Approximate Weights.	Cubic Measurements.
No. 3A, with top head and double grooving and boring attachment.....	1,300 lbs.	95"
No. 3B, with top and rear bottom heads and double grooving and boring attachment.....	1,600 lbs.	95"
No. 3C, with top, rear bottom and outside heads and double grooving and boring attachment.....	1,750 lbs.	95"
No. 3D, with top, rear bottom and outside and inside heads and double grooving and boring attachment.....	1,850 lbs.	95"
No. 3E, with top head and single plow and boring attachment.....	1,450 lbs.	95"
No. 3F, with top and rear bottom heads and single plow and boring attachment.....	1,550 lbs.	95"
No. 3G, with top and outside heads and single plow and boring attachment.....	1,550 lbs.	95"
No. 3H, with top, rear bottom and outside heads and single plow and boring attachment.....	1,650 lbs.	95"
No. 3K, with top, rear bottom and outside and inside heads and single plow and boring attachment.....	1,700 lbs.	95"

Tight and loose pulleys, 10" x 5".

Revolutions per minute, 900.

MORTISING MACHINES.

DESCRIPTION FIG. 12208.

This is a light but substantial and durable machine, complete in itself, and can be moved from place to place in the shop as needed. It is well adapted to the manufacture of doors, sash, and blinds, and other kinds of light work. It is made entirely of iron and steel in a first-class manner, and stands firmly upon its feet when in use.

POWER MORTISING MACHINE.



FIG. 12209.

Machine.
Power mortising machine.

Shipping Weight.
3,100 lbs.

SPECIFICATIONS.
T. and L. Pulleys.
12" diameter, 4" face

Speed.
360

Power.
1 horse-power

Floor Space.
3' x 4'

Care should be taken not to strain the counter spring tighter than is necessary to draw out the chisel, and when not in use the spring may be loosened so as not to destroy its elasticity. The loop which connects the trestle with the chisel block may be moved forward or backward to govern the depth of the mortise, or the power of the treadsles.

Five chisels are supplied with the machine, viz.: $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", and $\frac{3}{8}$ ".

The shipping weight of the machine is 250 lbs. Floor space, 2' 6" x 2' 8".

FOOT MORTISING MACHINE.



FIG. 12208.

DESCRIPTION FIG. 12209.

This machine is adapted to all ordinary work, and will bore and mortise all kinds of hard and soft wood of any size up to 12" deep and 8" wide.

The chisel has a stroke of 5". The pedestal has a wide reach, the column is hollow, giving great rigidity.

The reversing mechanism is very simple but accurate in its operation. The wearing parts are made of steel and hardened. There is an adjustable stop for the treadle, limiting its upward movement as desired. The rest is readily raised or lowered, and may be set at any angle desired. The balance weight is inside the column, holding the bearings firm and limiting vibration. The boring shaft is belted direct from the countershaft, which is furnished with the machine. There are also supplied with the machine one each augur bits and chisels of the following sizes: $\frac{3}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1".

NO. 1 MORTISER.

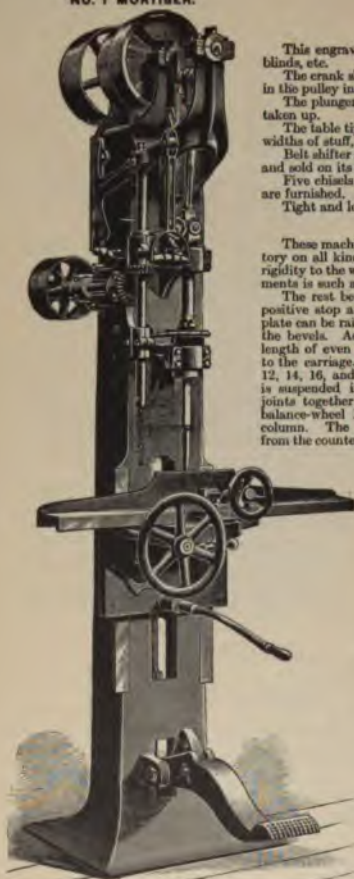


FIG. 12210.

one each chisel and auger bits of the following sizes: $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1". Will bore and mortise hubs up to 12" in diameter and 10" long.

With the No. 2 machine are furnished one each chisel and auger bits of the following sizes: $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ " and $1\frac{3}{4}$ ". Will bore and mortise hubs up to 16" in diameter and 24" long.

With the No. 3 machine is furnished the same outfit of auger bits and chisels as with the No. 2. Will bore and mortise up to 20" in diameter and 24" long.

Machines.	Shipping Weight.	T. & L. Pulley.	Speed.	Power.	Floor Space.
No. 1 hub machine...	2,400 lbs.	12" diameter, 4" face	300	1½ h.p.	3' x 3'
No. 2 hub machine...	3,100 lbs.	12" diameter, 5" face	300	2½ h.p.	4' x 4'
No. 3 hub machine...	3,900 lbs.	12" diameter, 6" face	300	2½ h.p.	4' x 4'

MORTISING MACHINES.

DESCRIPTION FIG. 12210.

This engraving represents the new No. 1 mortiser, designed for mortising doors, sashes, blinds, etc.

The crank shaft is provided with an outside bearing. You will notice the balance is carried in the pulley instead of at the crank; this insures a much smoother running machine.

The plunger is square, working in a gun-metal conical split box, by which all wear can be taken up.

The table tips to mortise any angle required and adjusts to and from the column for various widths of stuff, drops 14°, and will mortise to the center of material 6" wide.

Belt shifter and stops are provided for boring attachment, and machine is strictly first-class and sold on its merits.

Five chisels: $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", five boring bits, reverse belt and necessary wrenches are furnished.

Tight and loose pulleys are 12" diameter, 3" face, and should make 500 revolutions.

DESCRIPTION FIG. 12211

These machines have been thoroughly tried out by long use, and have been found satisfactory on all kinds of material. The wide spread of the pedestal and the hollow column give rigidity to the whole mechanism, which insures good work, while the arrangement of the adjustments is such as to permit of the work being done expeditiously.

The rest bevel is constructed so as to give a positive stop at any required point, and the bed plate can be raised or lowered without changing the bevels. Adjustable stops for gauging the length of even or zigzag mortises are attached to the carriage. The dial ring is spaced for 10, 12, 14, 16, and 18 spokes. The counterweight is suspended inside the column, drawing the joints together and lessening vibration. The balance-wheel head is securely gibbed to the column. The boring shaft is driven directly from the countershaft.

The working parts of the machine are made in the best manner from the best material. The connecting rod is forged steel, the crank pin and the thrust pin of tool steel hardened. The reversing handle and the parts connected with it are carefully fitted to give accuracy to the stroke, and the whole bed mechanism is so arranged as to secure the best result with the least loss of time.

The machine is made in three sizes, countershaft furnished with the machine, and a full complement of cups for different sizes of hubs. With No. 1 machine are furnished

HUB MORTISER.



FIG. 12211.

MORTISING MACHINES.

NO. 1 AUTOMATIC VERTICAL
HOLLOW CHISEL MOR-
TISING MACHINE.

Export shipping weight.....	5,100 lbs.
Net weight.....	4,300 lbs.
Cubic measurement.....	176

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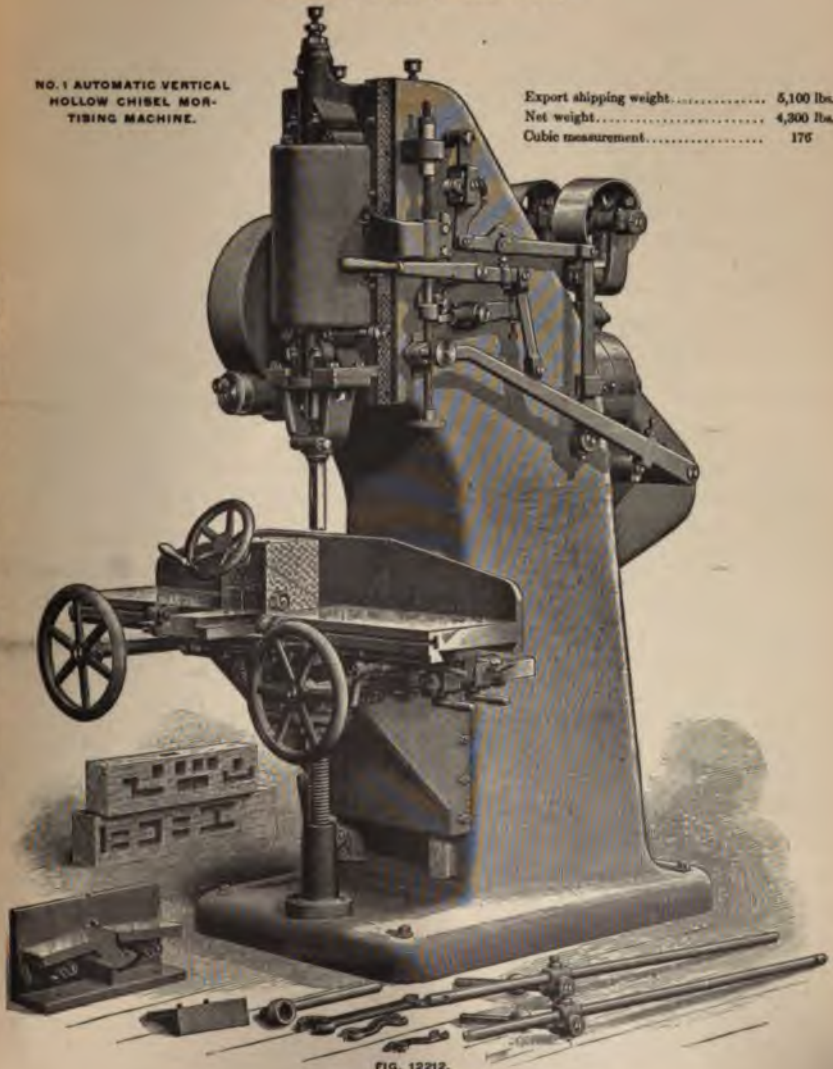
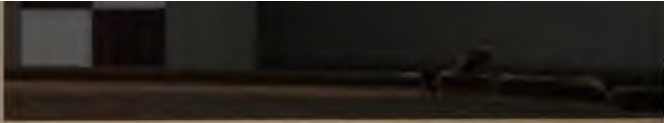


FIG. 12212.

For description, see following page.



MORTISING MACHINES.

DESCRIPTION FIG. 12212.—Continued.

The engraving represents our No. 1 automatic vertical hollow chisel mortising machine, designed for cutting mortises in either hard or soft wood. It has been designed for the use of manufacturers of wagons, agricultural implements, railway cars, shipbuilders, and various other woodworkers. The principle involved is the use of an auger revolving within a square hollow chisel attached to a vertically moving ram which is fed down to the work; a single movement produces a clean square mortise, corresponding to the exact size of the tools used. By moving the table horizontally and at right angles with a single auger and chisel, mortises of various widths and lengths can be cut, although one each $\frac{1}{2}$ ", $\frac{3}{4}$ ", $1\frac{1}{4}$ " and 1" augers and chisels are furnished with each machine.

This machine contains many new patented improvements. All the working parts are outside of the frame in plain view and easy of access which is a most desirable feature. The ram has a quick return and it is balanced in any position without the use of weight or spring, and it is entirely noiseless in its operation. The table is provided with a system of stops and gauges for laying off the work.

The frame is a massive casting in one piece, with cored center and a broad base. It is original in design and of sufficient strength to do the very heaviest class of mortising with ease. The ram to which the auger and chisel are attached is thoroughly gibbed to the frame in planed and scraped angle ways, and it is reciprocated vertically by means of a heavy worm gear and screw running in a reservoir of oil and driven by a double friction clutch. The auger spindle extending up through the center runs in self-lubricating bearings. The top end rotates against an adjustable bronze screw to support the end thrust, and it is also self-lubricating. The pulleys for driving the auger spindle are so constructed as to automatically maintain the proper tension to the belt at all times. The ram has a stroke up to 10", and its position is controlled by a convenient hand lever, a slight movement of which instantly starts or stops the feed or reverses it at any point. The depth of mortise can be changed instantly while the machine is in motion, by means of a screw adjustment. It has four rates of feed, with a quick return motion, enabling the machine to cut mortises in either hard or soft wood as large as 2" square at a single stroke.

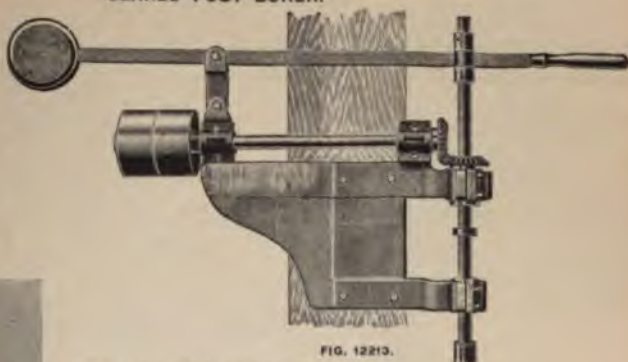
The compound table is thoroughly gibbed to the front of the frame, and it is supported upon a heavy steel screw operated by a convenient hand wheel for raising and lowering the table. To the table patent stops with micrometer adjustment are fitted to facilitate the duplication of mortises, and they can be instantly lifted up out of the way and the table moved in either a longitudinal or lateral direction and returned to its original position without destroying any of the adjustments. A chuck is furnished for angle mortising and it is laid off to 20°. Gauges are also supplied for gauging from the end of the work or from a mortise. A powerful adjustable clamp is fitted to the table for holding the work. It will accommodate stock 12" x 15" square and the machine will cut mortises in any position in a piece of timber of this size or any size under.

The counter is furnished as follows: Shaft, $1\frac{1}{2}$ " x 84"; two ball and socket adjustable drop hangers, with improved belt slipper attached; one driver, 18" x 3 $\frac{1}{2}$ ", for quick return; one driver, 8" x 4", and one 10" x 4"; one driver for auger spindle, 22" x 7 $\frac{1}{2}$ "; two pair of tight and loose pulleys, 12" x 6"; speeds, 750 and 550 turns per minute.

Horse-power to drive, 2; floor space occupied, 48" x 70".

BORING MACHINES.

GEARED POST BORER.



DESCRIPTION FIG. 12213.

A practical machine for boring holes from the smallest up to 2½" diameter. Rigid frame, strongly geared, easily put up, will bore 6" deep, depth regulated by set collars. No bits furnished. Tight and loose pulleys, 6" x 3½".
 Revolutions per minute, 300.
 Cubic measurement, 10.
 Approximate weight, 150 lbs.
 Average horse-power, ½.

NO. 1.



UPRIGHT BORING MACHINES.

DESCRIPTION FIG. 12214.

This is a small machine specially adapted for light, rapid work. All the parts of the machine are well made and carefully adjusted, and the spindle is tested at 4,500 revolutions.

The table is adjusted up or down by rack and pinion, operated by the crank, but has no tipping movement.

The belt on the tight and loose pulley is shifted by the foot lever, leaving both hands free to handle the work. The countershaft runs in self-oiling boxes. The spindle is bored to fit the Morse No. 1 drill socket.

The capacity of the machine is 8" from the column to center of bit, and 20" from highest position of table. The pulley on the spindle is 4" x 3½", and the driver, 12 x 2½".

FIG. 12214.

Machine.	Shipping Weight.	T. and L. Pulleys.	Speed.	Power.	Floor Space
No. 1 upright boring,	650 lbs.	6" diameter, 3" face	To suit work	1 h. p.	2' 6" x 3' 8"

DESCRIPTION FIG. 12215.

This is a newly designed machine, very heavy and rigid, with ample range and power for large and heavy work. The machine stands upon a broad foundation. The column is large in cross section and very strong, and the journal boxes are carefully made and adjusted.

NO. 2.



FIG. 12215.

BORING MACHINES.

DESCRIPTION FIG. 12215.—Continued.

The table may be set to any height and tilted to any angle. It is securely gibbed to the upright, and may be firmly clamped when set. The belt is shifted by the foot lever, leaving both hands free to handle the work. The bit spindle is driven by a 4" belt from a 15" pulley on the countershaft. The machine has a capacity of 15" from the column to the bit center, and 24" between the table at its lowest point and the bit at its highest point, with spindle movement of 10".

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Power.	Floor Space.
No. 2 upright boring machine.....	1,300 lbs.	5" diameter, 4" face	600	1 horse-power	3' x 7' 5"

DESCRIPTION FIG. 12216.

This machine is intended for light boring; has sliding table and pin stop to regulate the depth to be bored. Each machine is fitted with a little giant chuck, necessary wrenches, etc.; bits, extra.

Tight and loose pulleys are 8" in diameter and 3 1/4" face, and should make 600 revolutions per minute.

Weight, 310 lbs.

Belt required, 6 1/2' long, 3" wide.

NO. 3
HORIZONTAL
BORING
MACHINE.



FIG. 12216.

NO. 2
HORIZONTAL
BORING
MACHINE.

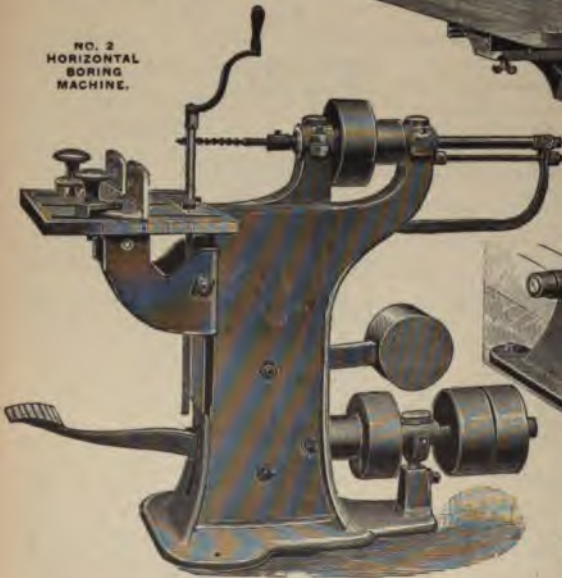


FIG. 12217.

DESCRIPTION FIG. 12217.

This machine is designed for all kinds of boring, in agricultural, wagon and furniture shops, etc. It is built entirely of iron and steel, is strong, convenient and compact. The work to be bored remains stationary on the table while the traversing steel spindle is moved up to it by means of a jointed treadle. The table

is substantially gibbed to the column, and can be raised or lowered to suit any work. It is also pivoted for boring at any desired upward or downward angle. The gauge slides on the table and adjusts for any angle, laterally, or for end boring. The depth to be bored is regulated by means of a spacing rod and collar.

We furnish five machine bits, 1/4", 3/8", 1/2", 3/4" and 1", necessary wrenches, etc.

Tight and loose pulleys are 8" diameter, 3 1/2" face, and should make 1,000 revolutions per minute.

Weight, 525 lbs.

Belt required, 6 3/4' long, 3" wide.

TENONING MACHINES.

NO. 13 TENONER.



FIG. 12218.

DESCRIPTION FIG. 12218.

This cut represents our new heavy pedestal frame tenoning machine. This machine contains more valuable features than any other machine for the purpose on the market. It is adapted for cutting tenons of any desired length, and is used for fitting stock for car door, sash, and blind, furniture and other like work.

The pedestal frame is cast in one piece, affording perfectly rigid bearings for all parts of the machine. The carriage runs upon roller bearings. It is lightly but strongly constructed, and it moves backward and forward with the greatest ease. There is a safety gib underneath the carriage at the working end which prevents it raising from its bearings. The hold-down bar is conveniently adjusted for any thickness of stock. The fence also is adjustable to any angle desired. There is also a stop gauge in front of the carriage so that the length of the tenon may be regulated when handling long stock.

The adjustments of the heads and copes are made by positive mechanism easily accessible. All bearings are self-oiling, and are protected from dust. The head stocks have independent vertical adjustments. The top head stock can also be adjusted horizontally, permitting any desired relations between the upper and the lower shoulders. By very simple arrangements the two heads may be rigidly connected, and both heads raised and lowered without changing the thickness of the tenon. Pneumatic pulleys on the tenon cutter shafts prevent the belt from slipping. The machine will cut tenons of any required thickness, from $\frac{3}{4}$ " to 3", and from $\frac{3}{4}$ " to $6\frac{1}{2}$ " long in one pass through the machine, and by twice passing through to 9" long.

A cut-off saw, with necessary attachments, is supplied when ordered. This is attached to the frame of the machine, the saw being behind the cope heads.

The cope heads are attached to the head stocks, and adjusted simultaneously with them; they also have separate independent horizontal and vertical adjustment. They are driven with long belts from the vertical countershaft. The cutter heads may be single, $3\frac{1}{2}$ " long, or double, $6\frac{1}{2}$ " long, as may be ordered. Both heads are driven by the same belt, consequently have the same speed. This belt is tightened by a self-adjusted idle pulley which keeps the belt always in tension.

The machine is shipped complete as shown, with countershaft built in.

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Power.	Floor Space.
Tenon machine.....	1,800 lbs.	10" diameter, 5" face	900	3 horse-power	3' x 7'

DESCRIPTION FIG. 12219.

NO. 2 MACHINE.

A newly designed heavy pedestal frame tenoner, adapted for making perfect tenons for doors, sash, blinds, framing or furniture work. Will cut a tenon 7" long at one operation or by passing through twice it will cut $9\frac{1}{2}$ " long. Any thickness of tenon can be cut from $\frac{3}{8}$ " to 5" thick by 1 1/2" wide.

The frame is heavy and cast in one piece, with openings in base for removal of shavings.

The head stocks are so arranged that the belt pulls to the bottom of the boxes on the lower head stock as well as on the top arbor. This is a new feature.

TENONING MACHINES.

NOS. 2 AND 3 TENONERS.



FIG. 12219.

DESCRIPTION FIG. 12219.—Continued.

Both head stocks have an independent vertical adjustment, and by a simple but effective device they can be instantly connected and both heads raised or lowered without changing the thickness of tenon. The top head stock has an independent horizontal adjustment to permit the shoulder to be cut at uneven distances from the end.

The cope heads are attached to main head stocks, and adjust with them. They also have an independent horizontal and vertical adjustment and are so arranged that the belt pulls to the bottom of the boxes.

The carriage has a double-roller movement, moves with extreme ease and enables the operator to turn out a large quantity of work. It is provided with a fence, which can be adjusted at an angle, and necessary gauges, stops and hold-down lever. It also has an attachment to prevent carriage from lifting off the ways, and a cleaning device.

The cut-off attachment is adjustable horizontally for different lengths of tenons while the machine is in motion.

The cutter head spindles are $1\frac{1}{2}$ " diameter, and the cope spindles are $1\frac{1}{4}$ " diameter.

The countershaft has an adjustable outside bearing beyond the tight and loose pulleys. All belts are long. The belt that drives upright cope countershaft does not drop off the pulley, owing to our new construction.

	T and L. Pulleys.	Revolutions per Minute.	Cut- Measurement.	Floor Space.	Approximate Weight.	Horse-power.
No. 2A, double heads, two copes.....	10" x 6"	900	71"	7' x 6'	1,650 lbs.	2 to 3
No. 2B, double heads, one cope.....	10" x 6"	900	71"	7' x 6'	1,620 lbs.	2 to 3
No. 2C, double heads, no cope.....	10" x 6"	900	71"	7' x 6'	1,500 lbs.	2 to 3
No. 2D, single heads, two copes.....	10" x 6"	900	71"	7' x 6'	1,625 lbs.	2 to 3
No. 2E, single heads, one cope.....	10" x 6"	900	71"	7' x 6'	1,600 lbs.	2 to 3
No. 2F, single heads, no cope.....	10" x 6"	900	71"	7' x 6'	1,475 lbs.	2 to 3
Rear cut-off saw attachment extra.....	.....	.....	.....	.....	.....	.....
Front cut-off saw attachment extra.....	.....	.....	.....	.....	.....	.....

NO. 3 MACHINE.

The same general description of our No. 2 Tenoner covers all the points in this machine, as it is built exactly like it except in size. It will cut a tenon $3\frac{1}{2}$ " long in one motion, or by passing through twice will cut tenons $5\frac{1}{2}$ " long and up to 14" wide.

The carriage has a double-roller movement, and is the easiest running that can be placed on a tenoner.

The cut-off saw attachment can be placed on either front or rear of machine, as desired, and is not furnished with machine unless especially ordered.

TENONING MACHINES.

DESCRIPTION FIG. 12210.—Continued.

	SPECIFICATIONS.					Horse-power.
	T. and L. Pulleys.	Revolutions.	Cubi Measurement.	Approximate Weight.	Floor Space.	
No. 3A, single heads and two copes.....	10" x 5"	900	55'	1,250 lbs.	5' 6" x 4'	1 to 2
No. 3B, single heads and one cope.....	10" x 5"	900	55'	1,200 lbs.	5' 6" x 4'	1 to 2
No. 3C, single heads and no copes.....	10" x 5"	900	55'	1,100 lbs.	5' 6" x 4'	1 to 2
Rear cut-off attachment extra.....	.....	.....	.....	.....	.....	.....
Front cut-off attachment extra.....	.....	.....	.....	.....	.....	.....

BOX BOARD MATCHER.

DESCRIPTION FIGS. 12220 AND 12221.

Our power feed box board matching machine is acknowledged on all sides to be the most convenient, efficient, and productive machine ever offered to the trade. It is compact and substantial, no small parts to get out of order, easily handled and changed, and built with special reference to accurate and rapid work.

It will match stock $\frac{1}{4}$ " to $2\frac{3}{4}$ " thick and can be changed to self-centering or face work in two minutes, and the feed rolls can be changed from one thickness of stock to another in ten seconds, this being done by the operation of the levers on the side.

It has three speeds of feed, 60', 95' and 130' per minute. The matcher arbor runs 4,500 revolutions with a 6" belt. The machine is arranged so that the operator stands close up to the feed rolls, feeding two rolls at one time, tonguing and grooving simultaneously, taking hold of the two boards when they leave the machine, joining them immediately together. Each machine is fitted for single tongue and groove, unless otherwise ordered. We also fit this machine for multiple matching; by which is meant material matched with more than one tongue and groove, to be reassembled, after being put together. It is also provided with proper facilities for piping, and there is a cast-iron cover to the cutters, keeping the machine entirely clear from sawdust and chips, and it has full set of wrenches for manipulating all changes, and countershaft and pulleys with complete belt shifting fixtures. The machine can be belted from above or below.

FRONT VIEW.



FIG. 12220.

REAR VIEW.



FIG. 12221.

At a slight additional expense, the machine is fitted with a power-driven glue attachment, when desired, which glues the tongue of the board as it passes through the machine. This glue attachment is brought close to the feeding-out rolls, so the work does not go beyond reach of the operator to glue every part of his work. This is a feature which will be appreciated by users of this class of machine.

The feed tables are adjustable and the machine may be used for jointing and matching if desired.

This machine is fitted with our No. 1 improved countershaft.

Shipped complete, as ordered, with one set matcher saws, countershaft, and necessary wrenches.

SPECIFICATIONS.

Machine.	Shipping Weight.	T. and L. Pulley.	Speed.	Power.	Floor Space.
Power-feed matcher.....	1,400 lbs.	10" dia., 6" face	950	3 h.p.	3' 9" x 5' 3"

TENONING MACHINES.



FIG. 12219.

DESCRIPTION FIG. 12219.—Continued.

Both head stocks have an independent vertical adjustment, and by a simple but effective device they can be instantly connected and both heads raised or lowered without changing the thickness of tenon. The top head stock has an independent horizontal adjustment to permit the shoulder to be cut at uneven distances from the end.

The cope heads are attached to main head stocks, and adjust with them. They also have an independent horizontal and vertical adjustment and are so arranged that the belt pulls to the bottom of the boxes.

The carriage has a double-roller movement, moves with extreme ease and enables the operator to turn out a large quantity of work. It is provided with a fence, which can be adjusted at an angle, and necessary gauges, stops and hold-down lever. It also has an attachment to prevent carriage from lifting off the ways, and a cleaning device.

The cut-off attachment is adjustable horizontally for different lengths of tenons while the machine is in motion.

The cutter head spindles are $1\frac{1}{2}$ " diameter, and the cope spindles are $1\frac{1}{4}$ " diameter.

The countershaft has an adjustable outside bearing beyond the tight and loose pulleys. All belts are long. The belt that drives upright cope countershaft does not drop off the pulley, owing to our new construction.

	T. and L. Pulleys.	Revolutions per Minute.	Cubic Measurement.	Floor Space.	Approximate Weight.	Horse-power.
No. 2A, double heads, two copes.....	10" x 6"	900	71"	7' x 6'	1,650 lbs.	2 to 3
No. 2B, double heads, one cope.....	10" x 6"	900	71"	7' x 6'	1,620 lbs.	2 to 3
No. 2C, double heads, no cope.....	10" x 6"	900	71"	7' x 6'	1,500 lbs.	2 to 3
No. 2D, single heads, two copes.....	10" x 6"	900	71"	7' x 6'	1,625 lbs.	2 to 3
No. 2E, single heads, one cope.....	10" x 6"	900	71"	7' x 6'	1,600 lbs.	2 to 3
No. 2F, single heads, no copes.....	10" x 6"	900	71"	7' x 6'	1,475 lbs.	2 to 3
Rear cut-off saw attachment extra.....	.....	.....	.....	.....	.....	.....
Front cut-off saw attachment extra.....	.....	.....	.....	.....	.....	.....

NO. 3 MACHINE.

The same general description of our No. 2 Tenoner covers all the points in this machine, as it is built exactly like it except in size. It will cut a tenon $3\frac{1}{2}$ " long in one motion, or by passing through twice will cut tenons $5\frac{1}{2}$ " long and up to 14" wide.

The carriage has a double-roller movement, and is the easiest running that can be placed on a tenoner.

The cut-off saw attachment can be placed on either front or rear of machine, as desired, and is not furnished with machine unless especially ordered.

WOOD TRIMMERS.

NO. 4A TRIMMER.
FRONT VIEW.



FIG. 12222.

NO. 4A TRIMMER.
REAR VIEW.



FIG. 12223.

NO. 8E UNIVERSAL
TRIMMER.



FIG. 12224.

DESCRIPTION FIGS. 12222 TO 12225.

Every accurate woodworker should have one of these tools immediately at hand at all times.

SPECIFICATIONS.

The No. of Machine is Height of Cut in Inches.	Length of Cut.	Size Box.	Between Gauges.	Length of Stroke.	Cubic Feet.	Export Shipping Weight.
2A.....	4½"	4½" x 10½"	8½"	5"	¾	11 lbs.
4A.....	8"	7½" x 17½"	14"	9"	1	36 lbs.
5A.....	8½"	9½" x 20"	16½"	8½"	1½	55 lbs.
6A.....	12½"	11½" x 27½"	22"	13½"	4½	144 lbs.
3B.....	6"	6" x 15"	12"	6½"	¾	30 lbs.
4B.....	8"	8" x 20"	16½"	8½"	1½	47 lbs.
4E.....	9½"	13" x 29½"	17½"	9½"	8½	237 lbs.
6E.....	12½"	18" x 30½"	24½"	13½"	18½	300 lbs.
6F.....	19"	18" x 35"	19"	27"	30	600 lbs.
8F.....	24½"	24" x 40"	24½"	32"	48	900 lbs.

NO. 8F UNIVERSAL TRIMMER.

DESCRIPTION FIG. 12225.

While the No. 8F universal trimmer is widely and favorably known at the present time, the enormous improvements now incorporated in its construction will still further commend it to all. Pattern shops now without a No. 8F universal trimmer are losing money. The same is true of all other sensible wood workers.

The weight and rigidity of the machine is beyond all criticism. At the same time its arrangement on an eccentric castor base makes it possible to have it stand firmly on its foundation and by simply taking hold of the handle and giving it a slight pull forward into the most convenient position for using it as a handle, you will find the machine upon convenient rollers so that a boy can move it anywhere around the shop.

For specifications, see preceding page.



FIG. 12226.

NO. 3 FOOT POWER MITER CUTTER.

DESCRIPTION FIG. 12228.

These machines are made in sizes as noted below for hand, foot, or belt power. The No. 3 machine shown in illustration is the most popular size, being especially adapted to interior finish, mantel and cabinet work, also picture-frame work, etc.

SPECIFICATIONS.

Number.	Bed.	Stroke.	Miter Beddngs.	Shipping Weight.
No. 2 hand power . . .	6' x 9"	3 1/4"	2" wide	25 lbs.
No. 3 foot power . . .	9' x 12"	4 1/2"	3" wide	175 lbs.
No. 5 foot power . . .	15' x 20"	6 1/2"	5" wide	330 lbs.
No. 4 belt power . . .	18' x 24"	5"	4" wide	650 lbs.

Squaring gauges or bed plates are furnished at extra cost



FIG. 12226.

DISK SANDPAPERING MACHINES.

NO. 6 MACHINE.

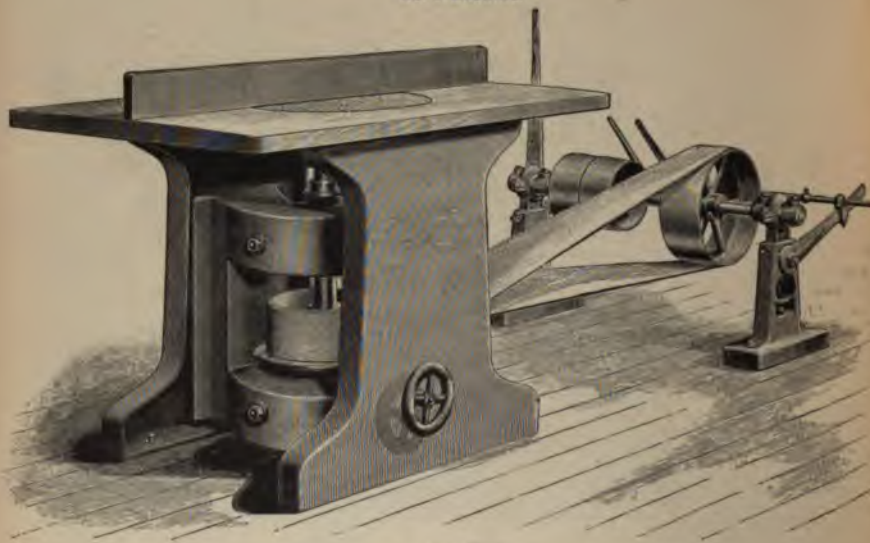


FIG. 12227.

DESCRIPTION FIG. 12227.

NO. 6.

The table, of iron, is cast in one piece and planed true over the entire upper surface. It is 36" wide by 54" long, and the hole in the center is bored out true, with a heavy rib running around the hole on the under side for strength; an adjustable fence crosses the center, allowing two operators to work, one on each side of the machine, at the same time.

The vertical spindle, carrying the sandpaper disk, is of steel, $2\frac{3}{8}$ " diameter, and it runs in large self-oiling connected bearings, which are attached to the heavy iron frame. All the bearings are so enclosed as to prevent the admission of dust and dirt. The hand wheel shown at the base of the frame is used for vertically adjusting the disk to suit different depths of cut; this adjustment can be effected while the machine is in motion.

The sandpaper disk is 22" diameter and covered with a yielding material over which the sandpaper is placed and securely stretched by a friction ring pressed below its cutting surface. By this device the sandpaper can be quickly renewed when worn out.

The counter consists of the following parts: Shaft, $1\frac{9}{16}$ " x 48" long; two No. 2 ball and socket adjustable floor stands; driver, 14" x 5"; tight and loose pulleys, 10" x 5"; speed, 700 rotations per minute. A convenient belt shifter is furnished as shown by the engraving. Horse-power to drive, 3; floor space occupied, 36" x 102". Weight, 1,700 lbs.

NO. 7.

The table, of iron, is cast in one piece and planed true and smooth on top. It is 48" wide, 66" long. The hole in its center for the polishing disk is bored out true. The fence, or gauge, running lengthwise, and in the center of the table, enables two operators to work on the machine at the same time.

The vertical spindle carrying the sand disk is of steel, $2\frac{3}{8}$ " diameter, and it runs in large self-oiling bearings, which are enclosed to prevent the admission of dust or dirt, and it is provided with a vertical adjustment to regulate the depth of cut, which can be effected while the machine is in motion.

The polishing disk is 36" diameter, and covered with a yielding material over which the sandpaper is placed and securely stretched by a friction ring pressed below the cutting surface. By this device the sandpaper can be quickly removed when worn out.

The counter is furnished as follows: Shaft, $1\frac{9}{16}$ " x 48" long; two No. 2 ball and socket floor stands; driving pulley, 14" x 5"; tight and loose pulleys, 10" x 5"; speed, 700 rotations per minute.

Horse-power to drive, 3; floor space occupied, 48" x 114". Weight, 2,100 lbs.

NO. 1 24" HORIZONTAL HAND FEED SANDPAPERING MACHINE.

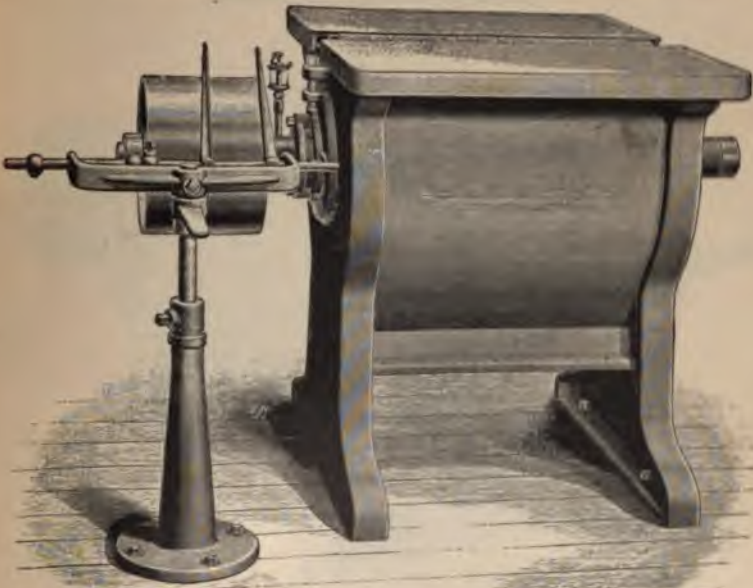


FIG. 12228.

DESCRIPTION FIG. 12228.

This engraving represents our improved No. 1 24" horizontal hand feed sandpapering machine, which has been designed for polishing and finishing wood work of various kinds, and preparing it ready to receive the varnish or paint.

The frame is a substantial iron casting with cored center made dust-proof, with an opening at the bottom, which is tapped for blow-pipe connection, for the discharge of the dust.

The tables, of iron, are planed true and screwed to the top of the frame so that they can be quickly removed to give free access to the polishing drum and parts.

The polishing drum, of iron, 24" long, is cast in one piece, turned true and balanced to a running balance by our patent centrifugal balancing machine; its outer surface is covered with a felt cushion and over this the sandpaper is stretched; the drum is provided with a vertical adjustment to regulate the depth of cut.

The tight and loose pulleys are 12" diameter, 4" face, and should run 1,000 revolutions per minute. It is furnished complete with a convenient belt-shifting apparatus, as shown.

Horse-power to drive, 2; floor space occupied, 36" x 48". Weight, 1,150 lbs.

**NO. 2 24" HORIZONTAL DRUM AND DISK
SANDPAPERING MACHINE.**

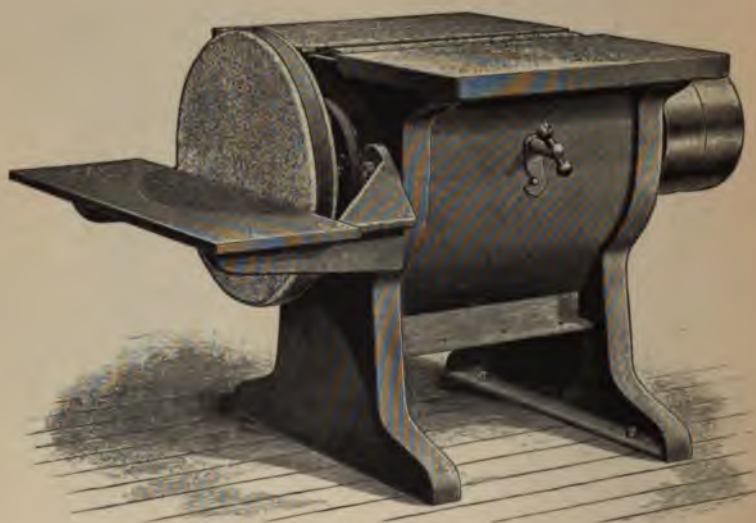


FIG. 12229.

DESCRIPTION FIG. 12229.

This engraving represents our No. 2 24" horizontal drum and disk sandpapering machine which has been designed for polishing and finishing woodwork of various kinds and preparing it ready to receive the varnish or paint.

The frame is a heavy casting with corse center, made dust-proof, provided with an opening at the bottom for exhaust pipe connection for the discharge of dust.

The tables are of iron, planed true, and easily removed to give free access to the drum and parts.

The polishing drum, of iron, is 24" wide, turned true and balanced by our patent balancing system. Its outer surface is covered with a felt cushion, and over this the sandpaper is stretched by a simple and quick method. The drum is provided with a vertical adjustment to regulate the depth of cut.

The polishing disk is 22" diameter, and its face is covered with a felt cushion, and over this the sandpaper is stretched and held in position by a friction ring. The table in front of it is of iron, planed true, and it is large and roomy.

The tight and loose pulleys are 12" diameter, 4" face, and should run 1,000 rotations per minute.

Horse-power to drive, 2; floor space occupied, 36" x 64". Weight, 1,400 lbs.

NO. 1 PATENT CHAMPION WOOD POLISHING MACHINE.



FIG. 12230.

DESCRIPTION FIG. 12230.

The engraving represents a sand-belt polishing machine especially intended for wagon, carriage, and agricultural implement builders. It is used for polishing shafts, poles, axles, bolsters, bent and sawed hounds, plow beams and handles, and other classes of work.

The body of the machine is of neat design and strongly constructed of a hollow column.

The upper wheel is 24" x 6" face, covered with a rubber tire 2" thick, forming an elastic cushion.

The table, of iron, is fitted to the main frame and it can be adjusted vertically for regulating the depth of cut. The end bracket which projects downward from the table is used to support the material when finishing the end, such as the end of plow beams, wagon tongues, bolsters, etc. The table can be quickly removed from the machine, when it is in proper condition for polishing bent woodwork.

The sand belt is 13' long, 6" wide, and it is strained upward by a right and left hand screw to tighten the belt, with adjustment sufficient to accommodate a variation of 12" in length of the belt.

The counter should be located underneath the floor; the driver is 24" x 6"; shaft, 36" x 1 1/2"; two No. 2 drop hangers; tight and loose pulleys, 10" x 6"; speed, 600 rotations per minute, giving 4,500' sand-belt speed.

Horse-power to drive, 1 1/4; floor space occupied, 24' x 36' Weight, 900 lbs.

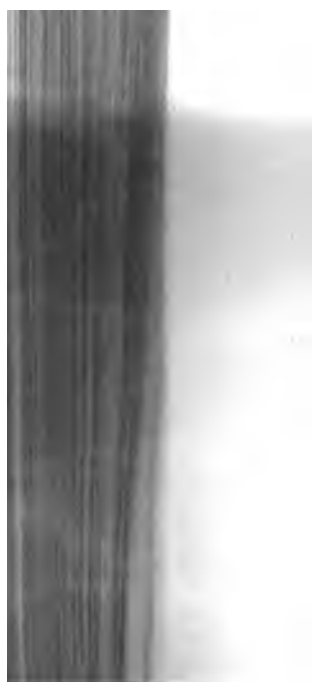
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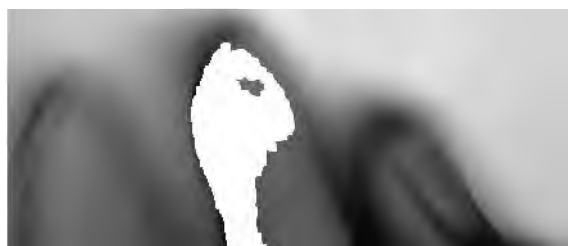














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